SUSTAINABILITY STUDY
FOR A
GEORGIA GEOGRAPHIC INFORMATION OFFICE

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Executive Summary

In June 2014 a task force empanelled by the Georgia Technology Authority (GTA) recommended that a consultant-facilitated study be completed to determine business sustainability options for a proposed Geographic Information Office (GIO). The University of Georgia, supported by the Polis Center at Indiana University Purdue University at Indianapolis, was selected for this study.

This report represents the findings from that study and provides the requirements, options and recommendations to sustain a GIO. It also addresses business model and funding elements, identifies potential market and product offerings, discusses the anticipated customer base and addresses other financial considerations related to sustaining GIO beyond the initial two years currently funded.

The study began by collecting information from key Georgia stakeholders who were believed could benefit from and / or contribute to the success of a GIO. Most of the interviews were conducted on-site in Atlanta and central Georgia during the week of December 8 to 14, 2014, with the remainder being held by phone immediately following the on-site meetings.

The interview process resulted in a number of key findings that were used to provide context for this report and to guide many of the recommendations. Of special significance were points that were made multiple times by people in different participating agencies that represented strong agreement about how the GIO should be created or run over the long haul, or that affected or measured success of the Office. Those points included:

- From organizational and political perspectives, the GIO must be located such that city, local, and state agencies and departments are served equitably. Related to that, the GIO will not be successful if it is placed within an organization that consumes a disproportionate amount of the resources of the GIO for its own purposes. The GIO will more likely be viewed by both state and local governments as a credible and authoritative entity if it exists within state government. The GIO needs to be organizationally near enough to state decision makers to have influence, but not so close to the center of state government to be automatically impacted by gubernatorial change.

- Resistance to sharing data on the part of geospatial data stewards around the state is a risk to the GIO and an important challenge, especially given existing statutory language that allows the sale of government data. Consideration must be given to legislative change to create an exemption of the sale of geospatial data.[1]

- The Geographic Information Officer will need to create and maintain relationships with the GIS community in Georgia, and those that manage that community. That will necessitate travel, particularly in the beginning of the office.

- The qualities and qualifications of the Geographic Information Officer will be the most important factors influencing the success of the GIO. The Geographic Information Officer will need to have

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[1] See O.C.G.A. 50-29-2. This information is available in Appendix D.

outstanding people skills and the ability to create and articulate a vision of the office to stakeholders, partners, decision makers, and the GIS community in general.

- While specific thoughts were wide ranging about what would constitute a successful end point for the GIO, most thought that getting started and demonstrating consistent forward progress would be the ultimate measure of success.

This report presents findings and makes recommendations in several areas that are critical to the long term sustainability of a Georgia Geographic Information Office.

Qualifications and Responsibilities of a Geographic Information Officer

- Of greatest importance is the ability to work effectively with people.
- Furthermore, the Geographic Information Officer must possess other key qualities and qualifications, including:

  o Superior communication skills, both verbal and written.
  o Experience and ability to formulate geospatial policy.
  o Understanding and appreciation of local and state political forces.
  o Ability to find "common ground" among groups with wide ranging goals and the ability to lead those groups toward shared objectives.
  o A working understanding of the technical aspects of geographic information systems.

- The overarching responsibilities of the Geographic Information Officer must include:

  o Coordinate geospatial efforts at all levels of government, higher education, and with the private sector within the state of Georgia. Government sectors include local, state, federal, and state to state coordination.
  o Be recognized as the official authority for pursuing grants and other funding to support statewide geospatial efforts.
  o Identify existing geospatial data throughout the state and integrate, as appropriate, that data into a cohesive data holding.
  o Identify unmet data needs and coordinate efforts to create and maintain data that satisfies those needs.
  o Coordinate the distribution of geospatial data from the state's data holding to organizations throughout the state and to the general public. This does not include data that is otherwise exempt from disclosure.
  o Review and approve the purchase and deployment of geospatial products and services within state government agencies to ensure maximum value.
  o Chair the Georgia Geospatial Advisory Council, established by statue under SB 361 in April 2014, to create geospatial policy and standards and create and chair a technical advisory group to help implement and enforce policy and standards.

Authority of Office

States with GIOs generally invest authority to the office by way of state statute, executive order, agency memorandums of understanding, or informal agreements. We recommend defining the Geographic Information Officer responsibilities and authority by way of a new state statute. This vehicle provides the best opportunity to clearly and authoritatively articulate all matters associated with the creation and operation of the office.

Location of Geographic Information Office

Both geographic and organizational considerations must be given to the location of the GIO. Geographically, a central location favors the ability to meet with partners and stakeholders across the state. However, face-to-face access to a majority of these groups is available in Atlanta. From an organizational perspective:

- Nearly all who participated in the interviews felt strongly that the GIO must be organizationally located in a neutral location, one in which the mission of the host organization supports the goals of the GIO and does not arrogate the resources of the GIO to the benefit of the hosting organization and the detriment of other stakeholders and partners.

- Some of the interview participants suggested that the GIO be located in or near the Office of the Governor to give it apparent authority. Others suggested that the GIO should find a location that is sheltered from administration changes to better ensure continuity.

- It was generally agreed that the GIO should be located within a state agency rather than a local or regional government organization or university to establish authority and credibility. Many, though, noted that it will be important for the Geographic Information Officer to be able to build and maintain relationships at all levels of government, with higher education, and with the private sector.

- The 2013 National States Geographic Information Council (NSGIC) GIS Maturity Assessment showed that Geographic Information Offices were most commonly located within the state office of information or technology. Other states located the office within another existing state agency or the Governor's office.

Several possible locations were noted by those that participated in the December 2014 Georgia interviews. These included the Department of Community Affairs (DCA), the Georgia Technology Authority, Office of Planning and Budget (OPB), and Emergency Management Agency (GEMA). Each offers both advantages and disadvantages as hosting agencies. Ultimately, this decision must be made by the Georgia GIS community, so we recommend opening discussions with each to determine willingness, organizational logic, and available financial support to host the Geographic Information Office.

Staffing of Geographic Information Office

We believe that a minimalist approach to staffing the Georgia GIO is appropriate to begin the office. In addition to the Geographic Information Officer, we recommend having an Office Administrator that supports administration of calendars and routine communication, organizing education events, etc. We also recommend that a GIS Analyst be part of the GIO staff. Analyst responsibilities would include data

processing, map creation, and application development. Additional staff can be added as determined by need and available funding.

Costs and Funding

Administrative and operational costs consist of those costs needed to operate the GIO and include salaries and benefits, office costs (space, phone, communication, and technology), travel costs, and incidentals (memberships, conference attendance, postage, etc.). We estimate that administrative and operational costs will initially be in the range of $300,000 to $400,000 annually and will adequately cover resources that are required to accomplish the core work of the GIO. Core work includes efforts associated with collaboration and coordination, education and outreach, pursuit of funding, grant and agreement administration, and integration of framework data sets produced by others. Core work does not include the creation and maintenance of data.

We looked at several funding models including dedicated funds, mission driven funds, agency assessments, central and capital funds, and cost recovery funding. We believe that funding that is derived primarily from dedicated funding provides the best opportunity for the Geographic Information Office to be sustainable. Furthermore, we recommend minimum reliance on cost recovery funds produced through sale of data or services because the GIO will be the most successful in an environment that establishes the free exchange of data and that allows the GIO to serve a broad community of geospatial users without regard to payment for services.

Market Offering and Customer Base

The Georgia GIO offers a unique value proposition to the organizations and the public using geospatial technology and/or data, including the citizens of the state. There is no other entity in the state with the sole responsibility and authority to coordinate the collection, integration, creation, and maintenance of the state's geospatial data holdings. This provides an enormous opportunity for the state of Georgia in terms of tax dollars saved, increased quality of life, improved public safety, and increased economic prosperity.

Given the responsibilities that are proposed in this document as well as those identified in the terms of the two year grant provided by the U.S. Economic Development Administration, we can envision the customer base that will be served by the Georgia Geographic Information Office. These customers can be organized into the following groups:

- State government agencies
- Regional government
- Local government
- Higher education
- Private sector (for profit and not-for profit)
- The general public

The GIO will want to identify its offering to its customer base by establishing a clear brand identity and image.

Financial Considerations, Revenues, and Costs

We foresee minimal revenues for the GIO generating from data sales and only supplementary revenue coming from services. On the other hand, many data sets have been identified that can be integrated from other data stewards within the $300 thousand to $400 thousand base costs for the GIO. Other data, such as statewide orthoimagery and LiDAR, will require the GIO to seek funding partners whose missions will be advanced by the availability of such data.

Other Considerations

This report also includes other considerations which the authors feel will impact the success of the Georgia GIO, but which did not fit well in other sections of the report. These considerations include an analysis of strengths, weaknesses, opportunities, and threats associated with establishing and operating the GIO; establishing or strengthening stakeholder and partner relationships, both formal and informal, in the first 90 days; the creation, composition, and use of search, hiring, and advisory groups; the use of a pilot project area to show early value of the office; and partnerships and best practices to consider.

Purpose

In 2013 the Georgia Technology Authority (GTA) empanelled an inter-agency Geographic Information Office (GIO) Task Force for the purpose of identifying the resources necessary to establish and sustain a GIO. This task force prepared a report[2] that proposed a solution for establishing a Geographic Information Office (GIO). In addition, they successfully pursued a grant through the US Economic Development Administration to fund the proposed GIO model for a period of two years. This grant was awarded in July 2014.

In June 2014 the task force presented its recommendations to the GTA and other strategic stakeholders. GTA determined that it would be prudent to commission a consultant-facilitated study to determine business sustainability options for the proposed GIO. The University of Georgia, supported by the Polis Center at Indiana University Purdue University at Indianapolis, was selected for this study. This team brings years of experience working with the State of Georgia as well as with other states on the implementation of GIS solutions.

The information that follows defines the requirements, options and recommendations to sustain a GIO. It also addresses business model and funding elements, identifies potential market and product offerings, discusses the anticipated customer base and addresses other financial considerations related to sustaining the GIO beyond the initial two years currently funded.

Section 1: Methodology

A critical part of this study was the collection of information from key Georgia stakeholders that are anticipated to benefit from and / or contribute to the success of a GIO. Most of the interviews were conducted in the offices of those interviewed in Atlanta and central Georgia during the week of December 8 to 14, 2014, with the remainder being held by phone. Interview participants are identified in Table 1.

Table 1: Stakeholder Interview Participants

Name	Title	Organization
Lonnie Sears	Geodetic Surveying Consultant	eGPS Solutions (representing the Surveying and Mapping Society of Georgia)
Terry Jackson	Emergency Management Specialist	Centers for Disease Control
Terry Lunn	Director Hazard Mitigation Division	Georgia Emergency Management Agency
Leanora Style	GIS Coordinator	Georgia Emergency Management Agency
Debra Elovich	Director, Space Management	State Properties Commission
Charlie Sasser	Senior Officer - Data Governance Strategy	Georgia Technology Authority
Dave Wills	Government Relations Manager	Association of County Commissioners of Georgia

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[2] A Geospatial Network and Geospatial Information Office for Georgia: Report of the Georgia Technology Authority Geospatial Information Office Task Force. September 9, 2014. Print.

Name	Title	Organization
Goron Freymann	Director, Office of Health Indicators for Planning	Georgia Department of Public Health
Jeff McMichael	Director, Spatial Analysis and GIS Team	Georgia Department of Public Health
Tim Maquire	Senior GIS Analyst	Atlanta Regional Commission
Ernie Smith	GIS Coordinator	Baldwin County
Ralph Nix	Executive Director	Middle Georgia Regional Commission
Patti Cullen	Executive Director	River Valley Regional Commission
Brett Manning	Executive Director	Heart of Georgia – Altamaha Regional Commission
Allen Burns	Executive Director	Coastal Region Commission
Kenny Gilbert	GIS staff	Northeast Georgia Regional Commission
Chase Holden	GIS staff	Northwest Georgia Regional Commission
Shane Holden	GIS Staff	Northwest Georgia Regional Commission
Scott Jackson	GIS Staff	Heart of Georgia – Altamaha Regional Commission
Hunter Key	GIS Staff	Coastal Regional Commission
Nick Kouloungis	GIS Staff	Middle Georgia Regional Commission
Brent Lanford	GIS Staff	Middle Georgia Regional Commission
Heidi Penny	GIS Staff	Southwest Georgia Regional Commission
Teague Buchanan	Assistant Administrator, Office of IT Applications	Georgia Department of Transportation
Paul Tanner	Assistant State Transportation Data Administrator	Georgia Department of Transportation
Brad Hagen	Web Management Supervisor	Georgia Department of Economic Development
Subhro Guhathakurta	Director, Center for Geographic Information Systems as well as a Professor in the School of City & Regional Planning	Georgia Institute of Technology
Siva Ramachandra	Center for Geographic Information Systems	Georgia Institute of Technology
Ivan Sumter	Director, Data Sales	Georgia Technology Authority
Anup Dev	Senior Business Development Consultant	Georgia Technology Authority
Jimmy Nolan	Project Manager, Carl Vinson Institute Of Government	University of Georgia
Eric McRae	Associate Director, Carl Vinson Institute Of Government	University of Georgia
Yvonne Turner	Division Director of Administration	Georgia Office of Planning and Budget
Lisa Westin	Senior GIS Specialist	Georgia Department of Community Affairs
Elizabeth Smith	Senior Planner / Regional Programs Coordinator	Georgia Department of Community Affairs
Jon West	Program Manager, Local and Intergovernmental Planning	Georgia Department of Community Affairs

Interviews with Georgia data producers and key beneficiaries were guided by a series of questions provided to the participants in advance of their interview. A copy of this questionnaire is provided in

Appendix A. We also incorporated relevant findings from documentation related to GIO activities in other states, national legislation that impacts geospatial data development and management, and a variety of other information. These references are documented throughout the report and summarized at the end of the report.

The interview process resulted in a number of key findings that were used to provide context for this report and to guide many of our recommendations. Of special significance were points that were made multiple times by different participating agencies and people that represented strong agreement about how the GIO should be created or run over the long haul, or that affected or measured success of the Office. Those points are:

- From organizational and political perspectives, the GIO must be located such that city, local, and state agency and departments are served equitably by the GIO. Related to that, the GIO will not be successful if it is placed within an organization that consumes a disproportionate amount of the resources of the GIO. The GIO will more likely be viewed by both state and local governments as a credible and authoritative entity if it exists within state government. The GIO needs to be organizationally near enough to state decision makers to have influence but not so close to the center of state government to be automatically impacted by gubernatorial change.

- The GIO will need to create and maintain relationships with the GIS community in Georgia, and those that manage that community. That will necessitate travel, particularly in the beginning of the office.

- Resistance to sharing data on the part of geospatial data stewards around the state is a risk to the GIO and an important challenge, especially given existing statutory language that allows the sale of government data. Consideration must be given to legislative change to create an exemption of the sale of geospatial data.[3]

- The qualities and qualifications of the Geographic Information Officer will be the most important factors influencing the success of the GIO. The Geographic Information Officer will need to have outstanding people skills, the ability to create and articulate a vision of the office to stakeholders, partners, decision makers, and the GIS community in general.

- While specific thoughts were wide ranging about what would constitute a successful end point for the GIO, most thought that getting started and demonstrating consistent forward progress would be the ultimate measure of success.

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[3] See O.C.G.A. 50-29-2. This information is available in Appendix D.

In addition, we interviewed selected state geographic information officers or their equivalent who we believe have successfully established GIS within their states. Those who we interviewed included:

- Tim De Troye, State GIS Coordinator, South Carolina
- Bert Granberg, Director, Utah Automated Geographic Reference Center
- Shelby Johnson, State GIO, Arkansas
- Cy Smith, Geospatial Enterprise Officer, Oregon
- Bill Johnson, GIO, New York
- Kenny Miller, Deputy Geographic Information Officer, Maryland
- David Brotzman, Executive Director, Vermont Center for Geographic Information
- Bill Farnsworth, Geospatial Information Officer, Idaho

These individuals were asked questions about their budget, whether a strategic plan existed for their state, what their job role was, and whether and how their state received revenue from the sale of products and services. The answers to these questions were varied and wide ranging but confirmed data provided in a 2013 GIS Maturity Assessment performed and published by the National States Geographic Information Council (NSGIC).[4] Information from the NSGIC 2013 Maturity Assessment is referenced throughout much of this report.

The information gathered from the interviews, supplemental research and our own experience is presented in this report in five categories that address various aspects of establishing the GRCGN and GIO. These are:

- Business Model and Funding
- Market and Product Offering
- Customer Base
- Financial Pro Forma
- Other Considerations

Section 2: Business Model and Funding

Within the Business Model and Funding section of this report we consider several key questions related to the way that the GIO will be organized and funded. These questions and their answers, along with the qualifications and qualities of the person hired to be the Geographic Information Officer, will in large measure determine the success of the Geographic Information Office.

Key questions include:

- What responsibilities will be assigned to the GIO?
- What authority will be provided to the office to ensure that the responsibilities can be executed?
- Where will the GIO be located, both geographically and organizationally?

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[4] Source: National States Geographic Information Council. "GIS Maturity Assessment." September 2013. Web. http://www.nsgic.org/gma-2013/index.php?question_index=2

- How should the office be staffed?
- What are the administrative and operational costs?
- How will the office be funded?

In the following text we discuss these questions, describe viable options, and make recommendations that apply specifically to Georgia.

Geographic Information Officer

Qualifications

The people interviewed for this report nearly unanimously agreed that the single most important factor affecting the success of the Georgia GIO will be the people skills of the Geographic Information Officer. We concur. In addition, the Geographic Information Officer must possess other vital qualities and qualifications, including:

- Superior communication skills, both verbal and written.
- The experience and ability to formulate geospatial policy.
- An understanding and appreciation of local and state political motivations and forces.
- The ability to find "common ground" among groups with wide ranging goals and the ability to lead those groups toward shared objectives.
- A working understanding of the technical aspects of geographic information systems.

Bill Johnson, Geographic Information Officer for the state of New York, performed telephone interviews in the spring of 2013 seeking advice and guidance from GIS leaders in other states about the role of a state GIO. He summarized his findings about the required qualities of a GIO as follows:

> *"Every one of them stressed that their most important skill set is being able to work effectively with people and that this is the area where they spend most of their time. This skill set includes being able to communicate effectively and articulately, as well as being able to work together through sometimes difficult issues and build consensus. In all cases, the process of creating conditions that encourage voluntary cooperation and "buy-in" is a critical success factor. The [Geographic Information Officer] is considered a statewide leader and there is an expectation that the [Geographic Information Officer] will bring people together to create connections, find common ground, and build the support necessary to move ideas forward."[5]*

Many of these qualities and qualifications are expressed either explicitly or implicitly in the following language taken from IC 4-23-7.3, the Indiana state statute that created a GIO in that state. The entire statue is provided as Appendix B.

> "The individual … must be an experienced geography and mapping professional who has:
>> (1) Extensive knowledge of the principles, practices, terminology, and trends in GIS, spatial data, analysis, and related technology; and
>> (2) Experience in administration, project management, policy development, coordination of services, and planning."

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[5] Bill Johnson, Summary of GIO Interviews, June 7, 2013.

We recommend that these skills be included in the evaluation criteria for hiring and given high priority. NSGIC has made a number of sample Geographic Information Officer job descriptions available on its website. [6]

Responsibilities

Several short-term (two-year) goals to create or improve data have been recommended for the GIO in "A Geospatial Network and Geospatial Information Office for Georgia: Report of the Georgia Technology Authority Geospatial Information Office Task Force' published September 4, 2014, and funded as part of a grant secured from the Economic Development Administration. Specifically, the GIO, led by the Geographic Information Officer, will work to compile four critical base maps layers, including:

1) A parcel map and database
2) A building inventory map and database
3) A address map and database
4) A land use map and database

In addition, we recommend the following overarching goals be the responsibility of the Geographic Information Officer.

1) Coordinate geospatial efforts at all levels of government, higher education, and with the private sector within the state of Georgia. Government sectors include local, state, federal, and state to state coordination.
2) Be recognized as the official authority for pursuing grants and other funding to support statewide geospatial efforts.
3) Identify existing geospatial data throughout the state and integrate, as appropriate, that data into a cohesive data holding.
4) Identify unmet data needs and coordinate efforts to create and maintain data that satisfies those needs.
5) Coordinate the distribution of geospatial data from the state's data holding to organizations throughout the state and to the general public. This does not include data that is otherwise exempt from disclosure.
6) Review and approve the purchase and deployment of geospatial products and services within state government agencies to ensure maximum value.
7) Chair the Georgia Geospatial Advisory Council, established by statue under SB 361 in April 2014, to create geospatial policy and standards and create and chair a technical advisory group to help implement and enforce policy and standards.

Sample language related to defining the responsibilities in items 1 through 5 is contained within the Indiana GIS statute and included as Appendix B of this report.

Geospatial Technical Advisory Committee

This committee would not be created by statute but would be created and chaired by the state Geographic Information Officer and composed of representatives from stakeholders and partners including local and state government, higher education, energy utilities, the surveying community, etc. The purpose of the committee would be to complement the existing Georgia Geospatial Advisory

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[6] Source: National States Geographic Information Council. Sample job descriptions. Web. http://www.nsgic.org/publications-by-others

Committee which will advise the Geographic information Officer as to policy issues. The Geospatial Technical Advisory Committee, however, would advise the Geographic Information Officer as requested on technical matters related to carrying out the responsibilities of the Office. The location and the schedule of the technical meetings would be determine by the Geographic Information Officer. The Geographic Information Officer may also want to create regional working committees that are a part of the Technical Advisory Committee.

Figure 1 shows that of the states surveyed in the NSGIC 2013 Maturity Assessment, 87% had either an official or Ad Hoc GIS Coordination Council.
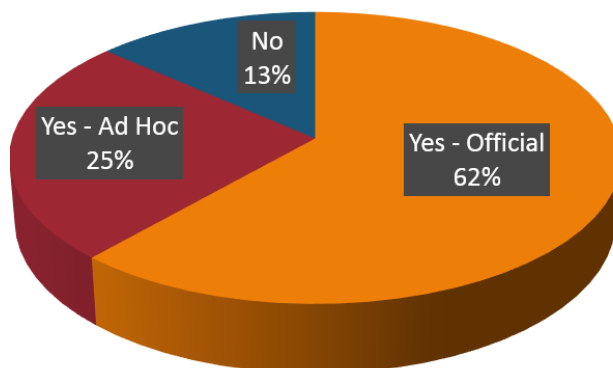
Figure 1: States with a GIS Coordination Council (Source: NSGIC 2013 Maturity Assessment)

As shown in Figure 2, the NSGIC 2013 Maturity Assessment also indicated that most of those councils were formed either through statute (33%) or Executive Order (31%).
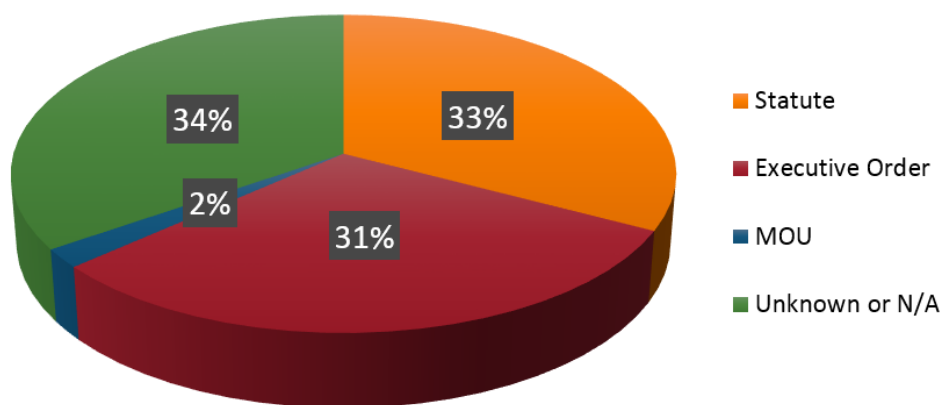
Figure 2: Source of Authority for GIS Coordinating Council (Source: NSGIC 2013 Maturity Assessment)

Authority

We believe that formal recognition of the responsibilities and authority of the Geographic Information Officer is essential. The NSGIC 2013 Maturity Assessment documented that 20 states provided authority to the Geographic Information Officer in state statute, nine used Executive Order, two added geospatial coordination responsibilities to the existing state IT office, and one state created authority via Memorandum of Understanding among participating state agencies.
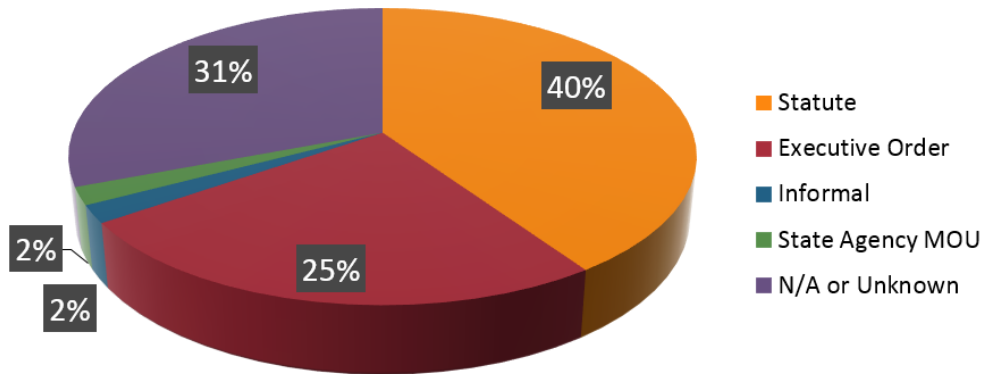
Figure 3: Geographic Information Officer Authorization (Source: NSGIC 2013 Maturity Assessment)

We recommend defining the Geographic Information Officer responsibilities and authority by way of a new state statute. This vehicle provides the best opportunity to clearly and authoritatively articulate all matters associated with the creation and operation of the office.

Geographic Information Office

Location

The location of the Georgia GIO is a key decision and must be viewed from a geographic perspective as well as an organizational perspective. The people who were interviewed for this report provided several practical considerations regarding the location of the GIO.

Geographic considerations include:

- The Geographic Information Officer will need to travel throughout the state to meet with stakeholders, partners, and the public. Stakeholders include state agencies that can contribute to or benefit from the resources of the GIO, state legislators, city and county governments, Federal agencies, Georgia Association of Regional Commissions (as well as the twelve commissions), Association County Commissioners of Georgia, Association of Georgia Land Surveyors, Surveying and Mapping Society of Georgia, energy companies such as Georgia Power, and Georgia's institutions of higher education such as the University of Georgia and Georgia Tech. While much of the business of the GIO can be accommodated by phone and email, face-to-face meetings will provide the best opportunity to create and extend relationships between the GIO and other organizations around the state. The Geographic Information Officer will need to bring many qualifications to the office. Building and maintaining relations will be one of the most important of those qualifications, especially in the first two years of the Office, and that will require significate travel. For that reason, several of those interviewed suggested that the Office be located in the central part of the state.

- Many of the stakeholders, partners and decision makers that will be impacted by the activities of the GIO are located in the state capitol. Interviewees pointed out, therefore, that it makes practical sense to locate the GIO office in the Atlanta area.

Organizational considerations include:

- Nearly all who participated in the interviews felt strongly that the GIO must be organizationally located in a neutral location, one in which the mission of the host organization supports the goals of the GIO and would not arrogate the resources of the GIO to the benefit of the hosting organization and the detriment of other stakeholders and partners.

- Some of the interview participants suggested that the GIO be located in or near the Office of the Governor to give it apparent authority. Others suggested that the GIO should find a location that is sheltered from administration changes to better facilitate continuity.

- It was generally agreed that the GIO should be located within a state agency rather than a local or regional government organization or university to establish authority and credibility. Many, though, noted that it will be important for the Geographic Information Officer to be able to build and maintain relationships at all levels of government, with higher education, and with the private sector.

According to the 2013 NSGIC Maturity Assessment there are 37 states with a Geographic Information Officer or officially recognized GIS coordinator. As shown in Figure 4 of those states, 25 housed the GIO within the state's information or technology agency, three within the office of the Governor, one within the state library, one with the state GIS council, and seven report to the heads of other departments.
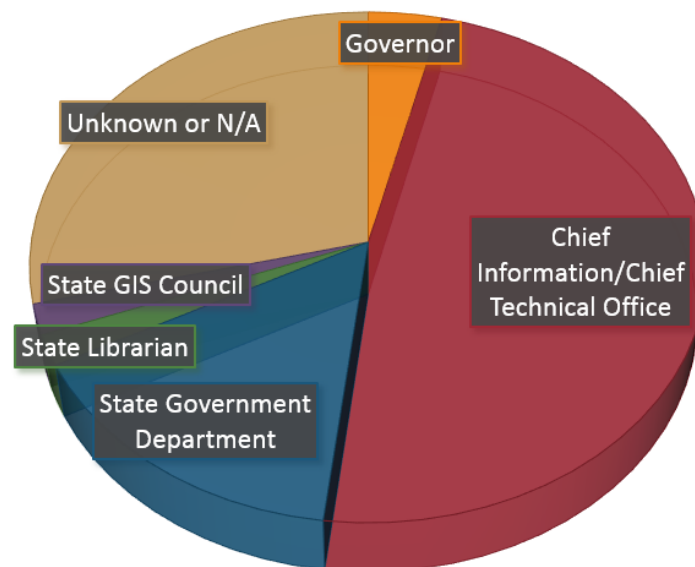
Figure 4: Geographic Information Office Location in other States (Source: NSGIC 2013 Maturity Assessment)

Interviews with selected state GIOs conducted as part of this project revealed specific reasons for locating their agencies within state government. These included agency executive support, neutrality, the ability to reach out to state government and agency politics.

Within the state governmental fabric of Georgia, several possible locations were noted by those that participated in the December 2014 Georgia interviews. These included the Department of Community Affairs (DCA), the Georgia Technology Authority (GTA), Office of Planning and Budget (OPB), and Emergency Management Agency (GEMA). DCA, GTA and OPB, along with a multi-agency option, were

also identified as possible GIO hosts in "A Geospatial Network and Geospatial Information Office for Georgia" report by the Georgia Technology Authority published in September 2014.[7]

Advantages and disadvantages were noted for each location.

Department of Community Affairs (DCA)

We noted several favorable characteristics of DCA given that it is a state government agency with responsibilities that require strong ties to local governments. According to DCA's 2014 Year in Review report, "The Georgia Department of Community Affairs has served as an advocate for our state's communities since 1977. After more than 35 years, DCA's programs and staff continue to provide critical support for community development, economic development, housing and quality of life initiatives throughout the state, to communities large and small, rural and urban. These efforts help fulfill our mission: Partnering with communities to help create a climate of success for Georgia's families and businesses." [8] These goals, which were rooted in the Georgia Planning Act 1989, appropriately parallel many of the responsibilities or objectives identified in this report for the GIO.

"The DCA promotes responsible development, a healthy environment and a high quality of life in each of Georgia's communities through a variety of partnerships with local governments, Georgia's 12 Regional Commissions and other state agencies."[9]

In addition, the DCA has both capacity and expertise in geospatial technology, as well as experience working with federal grants. As an early adopter of GIS, DCA also holds critical geospatial data.

These characteristics of the DCA – assisting local governments; liaising with local, state, and federal government agencies; provision of infrastructure and transportation; promotion of commerce; and protecting and preserving natural resources and the environment – are all activities which parallel those of a statewide GIO and which are supported by geospatial technology and data.

On the other hand, DCA has experienced severe financial cuts in recent years and may not be in a strong position to support a GIO. In addition, the DCA has not historically been viewed as being an active collaborator in the area of geospatial data and technology.

Georgia Technology Authority (GTA)

As noted above, about half of the states responding to the 2013 Maturity Assessment reported that the GIO was located within the state's Technology or Information Office. This is a logical placement, given that geographic information technology has much in common with information technology in general, not the least of which is that geographic information systems rely on application servers, data stores, networks, and information technology protocols and services. GTA is therefore a logical hosting agency for the GIO since they are the de facto information and technology office for state agencies. In addition,

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[7] A Geospatial Network and Geospatial Information Office for Georgia: Report of the Georgia Technology Authority Geospatial Information Office Task Force. September 9, 2014. Print.

[8] Georgia State. Department of Community Affairs. "*2014 Year in Review*." 2014. Web. http://www.dca.state.ga.us/main/about/downloads/DCA-2014-Year-in-Review.pdf

[9] Georgia State. Department of Community Affairs. "*2014 Year in Review*." 2014. Web. http://www.dca.state.ga.us/main/about/downloads/DCA-2014-Year-in-Review.pdf

GTA has established organizational relationships with most state agencies which would facilitate the administration of a GIO.

Conversely, the GTA is charged with a mission to be largely financially self-reliant and does this through data sales and charging for services. As discussed elsewhere in this report, neither of these revenue generators serve the overall long-term mission of a GIO. In addition, although the GTA has relationships in place with state agencies and is a neutral organization among these agencies, it does not have organizational relationships with city, county, and regional governments. A successful GIO, however, will require strong relationships with all levels of government.

Office of Planning and Budget (OPB)

OPB has some distinct advantages as a potential hosting agency for the GIO. The GIO could benefit from OPB's direct organizational tie to the governor in terms of establishing credibility and authority. In addition, the OPB's statewide view parallels that of the GIO. Similarly, the OPB's work with population projections has a strong tie to geographic information and work on this area would benefit both organizations mutually. Also, GIS offers significant capability in the area of decision support which is a focus of OPB.

There are also some disadvantages to OPB as a host to the GIO. OPB has no expertise in running on-going programs like those expected from a GIO. OPB does not have established relationships with local or federal agencies. Neither does it have core competency in geospatial technology. Finally, the direct tie to the Governor's office might also be disadvantageous in terms of risk of staff turnover during an administration change, including the Geographic Information Officer.

Georgia Emergency Management Agency (GEMA)

To its favor as a potential host of a GIO, GEMA has strong geospatial technology skills, works closely and well with local governments as well as state agencies, could be a contributor to statewide geospatial data as well as a benefactor, and has a statewide mission.

On the other hand, the strong focus on GIS within GEMA has the potential to subordinate the mission of a GIO as a means to satisfy its own mission. Other than the use of geospatial technology and data, there are no strong parallel mission elements shared by GEMA and the GIO. Therefore, although there may be some operational reasons, there are no strong organizational incentives to put the two together or that would increase the possibility of long term success of the GIO if hosted by GEMA.

Multi-Agency Option

An additional option noted in GTA's A Geospatial Network and Geospatial Information Office for Georgia" report envisions the possibility of rotating the hosting agency among interested stakeholder agencies. We feel that a permanent GIO "home" would be the most advantageous but this option provides some flexibility to respond to an ever changing financial and political environment.

Recommendation

Given the multiple and various advantages and disadvantages of each of these potential hosting agencies, we recommend opening discussions with each to determine current as well as future willingness, organizational logic, and financial support to host the GIO.

Staffing

How should the GIO be staffed? The simple answer is that the Office should be staffed so that its responsibilities can be accomplished. Using the responsibilities suggested above, we recommend that the office be staffed to include:

- The Geographic Information Officer
- Office Administrator. This position would be responsible for administrative support and coordination. This support may be provided by the hosting organization and includes administration of calendars and routine communication, organizing coordination and education events, etc.
- GIS Analyst. The position is responsible for the technical aspects of the office including data processing, map creation, and application development.

The NSGIC 2013 Maturity Assessment shows that of the 28 states that reported how many staff they have, ten states staff the GIO with 1 to 4 full time staff, including contract workers; seven states staff the office with 5 to 9; nine states have 10 to 14 staff, and 2 states have 15 to 19 staff. Therefore, a proposed staff of three represents an austere staffing model that will provide adequate staff to begin the work of a GIO, but with minimum cost.
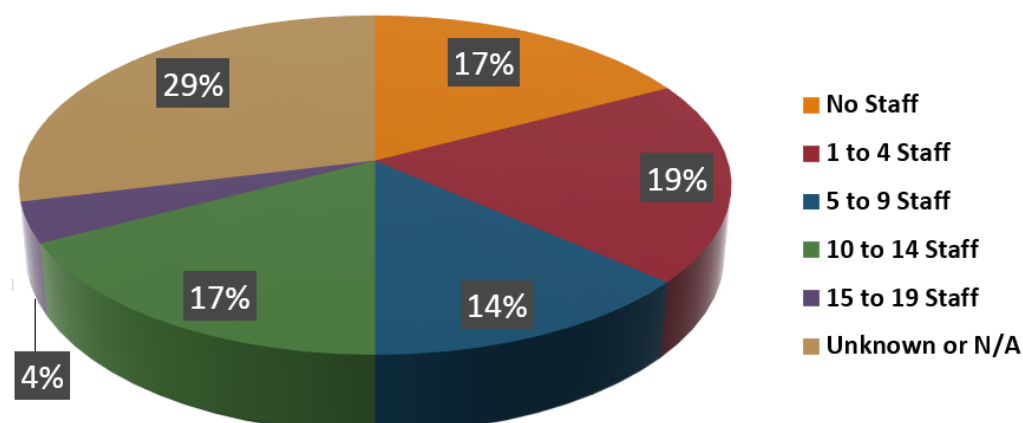
Figure 5: Number of Full-time Geographic Information Office Staff in other States (Source: NSGIC 2013 Maturity Assessment)

We believe that a minimalist approach to staffing the Georgia GIO is appropriate to begin the office. Additional staff can be added as determined by need and available funding.

Funding

Administrative and Operational Costs

Administrative and operational costs consist of those costs needed to operate the office including salaries and benefits, office costs (space, phone, communication, and technology), travel costs, and incidentals (memberships, conference attendance, postage, etc.).

We estimate that these initial administrative and operational costs are in the range of $300,000 to $400,000 and will adequately cover resources that are initially required to accomplish the work of the GIO. We anticipate that additional human and other resources will eventually be needed for the Office due to increased opportunities to provide benefits to GIO stakeholders and partners and that broader opportunities for funding will be available. For the purpose of this report, operational costs do not include costs for projects that are beyond the efforts of operations. For example, operational costs do not support acquiring statewide LiDAR. Project costs will vary depending on the specifications of each project, and which will require funding from other sources, including grants.

Table 2: Estimated Budget for Administrative and Operational Costs

Geographic Information office Budget Item	Annual Cost
GIO Salary	$ 80,000
Office Admin Salary	$ 30,000
Analyst Salary	$ 60,000
Benefits (at 30%)	$ 51,000
Office and Equipment	$ 60,000
Travel	$ 10,000
Incidentals	$ 10,000
Total	$ 301,000

An estimated annual operational budget of $300,000 to $400,000 per year aligns well with the budgets from eight states (Idaho, Indiana, Kansas, South Carolina, South Dakota, Vermont, Washington, and West Virginia) as collected in the NSGIS 2013 Maturity Assessment. These budgets ranged from $120,000 to $450,000 yearly, with an average of $284,000.

States generally fund the operation of their GIO with a blend of income sources that include state budget line items, contributions from the hosting agency, state agency cost share, and transaction taxes/fees. This is well demonstrated by the results of the NSGIC 2013 GIS Maturity Assessment. One of the questions asked in that assessment was "Over the past year, has your state utilized any special funds, grants or unique funding sources to help maintain its GIS coordination efforts or to produce data products?" We believe this question did not include a state budget line item as a funding source option – only special funds, grants, or unique funding sources. The answers and the number of states that provided each answer are reported in Table 3.

Table 3: Funding Sources (Source: NSGIC 2013 Maturity Assessment)

Funding Source	State Count
Federal Grant	31
Federal Partnership (MOA, contract, etc.)	17
9-1-1 Tax/Fee	14
Assessment on State Agencies/Cost Share/Charge Back	11
Property Transfer Tax/Fee	5
Environmental Assessment Tax/Fee	5
Other Telecommunications Tax/Fee	4
Wildlife Hunting Fishing Tax/Fee	3
Cost share among state and local levels of government	2
Disaster Recover Funds	1
Homeland Security	1
Education and Homeland Security	1
Executive Order	1
LCC partnership for hydrologic coordination	1
State Records Board Grants for development of parcels	1
Liquid Fuels	1

Federal agencies or departments that provided financial assistance are reported in Table 4.

Table 4: Federal Agency Funding (NSGIC 2013 Maturity Assessment)

Federal Agency	State Count
Interior	20
Homeland Security	12
Commerce	11
Transportation	11
Agriculture	8
EPA	8
FCC	8
NASA	4
NTIA	3
National Science Foundation	2
National Transportation Safety Board	2
USGS	2
Defense	1
Energy	1
Veterans Affairs	1

Funding Models

According to information collected by the Oregon Geographic Information Council (OGIC) in 2006, "Approaches to funding state spatial data development and coordination vary significantly. However, one point that was very clear was the use of multiple funding sources by the majority of states to support their efforts. The majority of states have a primary funding source augmented with several other secondary sources in support of spatial data development and coordination. The funding sources that were reported demonstrate a reliance on general funds, contract services, grants (primarily federal agency grants), and levied or voluntary agency assessments presented in the order of use."[10]

This document, although somewhat dated, nonetheless provides an excellent and relevant summary of state GIS funding models employed by the 12 states which were studied and which we believe still provide an accurate portrayal of contemporary GIS funding typical of most states. Those models include:

- Dedicated Funds
- Mission Driven Funding
- Assessments on Agencies
- Central and Capital Funding
- Cost Recovery

Because the issue of funding models is critical to this report, the sections describing each model as well as the discussions of the advantages and disadvantages from the report are presented below. We have added a new section to each model titled "Relevance to Georgia".

Dedicated Funds

The following segments are directly quoted from 2006 Oregon Geographic Information Council *Financing Report for navigatOR*.

> *One of the best sources of funding for any function of government is a dedicated source of revenue that provides a continuing stream of funding, often in perpetuity. For example, local governments operate utilities in this way, with dedicated funds based on user charges. State governments have traditionally more limited use of this approach, although some sales taxes, for example, are approved based on their use for dedicated purposes.*
>
> *Property transfer fees are well acknowledged as the key source of funds for the Wisconsin Land Information Program (WLIP), but statewide geospatial efforts are also conducted with general appropriation support. The WLIP's funding mechanism, which is a land-related documents recording fee collected by each County Register of Deeds, has generated over $70 million statewide since 1991. Oregon's legislature authorized the addition of a $1.00 fee to each land transfer to help develop a statewide property tax map, which has generated approximately $800,000 annually since its inception. While not included in this analysis, Vermont is the only other state known to have use of such fees to help support statewide geospatial data development or coordination. The Illinois legislature, however, recently authorized counties to*

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[10] Oregon Geographic Information Council. *Financing Report for navigatOR (Oregon's GIS Utility)*, 2006. Print.

adopt a fee structure for filing documents to be used strictly for GIS implementation and maintenance.

Advantages

"The advantages of this approach are several. Unless 'sunsetted,' the long term 'guaranteed' nature of such a source helps to make a state's geospatial program truly "official" and institutionalized, and thus it is considered a real part of state government.

State coordinators can develop and implement a long-term strategy, while others can rely on the program and its resulting data products with confidence that the program will be able to continue delivering such results in the long term. This assurance is a key need in order for a statewide coordination program to develop and deliver results when entering into alliances, as well as assisting others over the long term. The benefits of Wisconsin's program are multifold and include—1) land records modernization, 2) accelerated local government geospatial activities, 3) leveraging of federal funds, 4) reduction of title insurance costs, and 5) economic development (including the creation and expansion of consulting and software development firms). Such benefits could be replicated in another state."

Disadvantages

A key disadvantage of this approach is that it is very difficult to effectuate. Wisconsin was fortunate because it found the state land transfer fees to be lower than those elsewhere, so the State was able to justify an increase. It is a major undertaking to successfully gain sufficient legislative support for such a program. In the case of Wisconsin, many strong proponents in academia worked successfully with practitioners to achieve success. However, a key aspect of the program is that much of the funding is actually retained by the counties who collect the fees, and only a small portion is distributed back to the State. This was necessary to garner support from local officials. As a result, little of the funding is actually used for statewide data, and now the State faces the challenge of linking up all the county systems to help form a statewide data foundation. This is similar to the problem Oregon faces with its program, where the fee is dedicated to producing a map that improves the tax assessment process, with no clear definition in statute of the content of the data needed to produce such a map and no direct link to statewide geospatial efforts whereby the data could be used for other purposes.

Relevance to Georgia

A dedicated fund, especially one that would come from the state budget, would allow the Office to spend less time in pursuit of operational funding and more time to accomplish the goals of the Office. We do not believe that dedicated funding is necessary for most project specific efforts, with the possible exception of statewide orthoimagery and LiDAR acquisition, given the nearly universal benefit provided from these data and the savings that can be accomplished from statewide versus local acquisition. We recognize, however, the likelihood of resistance to a state budget increase to support the Office.

One example of a state that currently has identified dedicated funding as a valid revenue source is Vermont. The interview with the Vermont GIO conducted for this study revealed that a small portion of the property transfer fee is used to help support Vermont's geospatial coordination. The GIO receives approximately $378,000 annually from this revenue.

Mission Driven Funds

The following segments are directly quoted from 2006 Oregon Geographic Information Council *Financing Report for navigatOR*.

> *Several states have benefited from the realization and the policy direction that a state government mission can be aided by alignment of the statewide geospatial coordination efforts with that mission. The actual existence of some of these missions varies by state depending on policy decisions and state roles in relation to local governments, such as with E-911 and some land use and conservation efforts described below. However, all state governments share other missions, such as state lands and asset management.*

> *E-911 is a key government mission, with data responsibilities sometimes assigned to state government. For example, State government in both Maine and Oregon decided to develop a data foundation for E-911 at the state level (rather than at a local level as is the case in most states). Directors of E-911 in both states have coordinated with their statewide geospatial offices on this work. For the Maine Office of Geographic Information Systems (MEGIS), this project has been providing over $700,000 annually.*

> *However, this amount will be less when the project moves to a maintenance level. This work is providing MEGIS and the Oregon Geospatial Enterprise Office (GEO) with the ability to develop statewide transportation and addressing foundational data. In Oregon, however, there remains some question as to the availability of this data for enterprise purposes, based on statutory authority local governments have to control this data and charge cost recovery fees for access.*

> *Virginia's geospatial coordination office secured $10 million in funding from the State's Wireless E-911 Fund to help fund data efforts, specifically high-resolution imagery, the development of a statewide road centerline file with address attribution maintained by the geospatial coordination office in coordination and cooperation with the 134 local government jurisdictions in Virginia, and the development of a statewide surface water data set. The Virginia Geographic Information Network office is located in the Virginia Emergency Preparedness Office and has an annual budget of approximately $2.2 million. Arkansas is another state that has benefited from mission driven funding for spatial data development. Arkansas created a GIS Fund that is organized as a trust fund, and funds for the Trust Fund can be obtained from a variety of sources (funding approved by the General Assembly, grants, gifts, state and federal funding, etc.). The funding is not subject to rollback into the General Revenue Fund at the end of a fiscal year.*

> *Additionally, a grant of almost $1.0 million was provided by the Economic Development Fund of Arkansas to assist in data efforts. Information is provided later about Arkansas' innovative funding approaches that are beginning to add monies to the Trust Fund.*

> *South Carolina is another state that has long been recognized for the mission driven funding approach it used for statewide data development to support economic development initiatives.*

> *Conservation of open space and land planning (often termed "smart growth") initiatives also have been legislated as a state mission in several urbanized and growing states and they provide strong drivers for statewide data development. Florida, Maryland, and Massachusetts have used funding for this purpose for statewide data development. Such data is needed for local and*

statewide land use planning and also to determine and prioritize individual parcels of land that should be acquired or otherwise conserved for public use or open space, often as part of multimillion-dollar land acquisition programs.

These states were not included in this project due to their limited or non-existent statewide geospatial coordination programs, but these missions have provided significant funding for data development. Massachusetts' de facto lead geospatial office has been developing data for the State's local governments to aid in their land planning efforts based on 1998 legislation. Florida's and Maryland's geospatial development has grown due to such State initiatives, but because the states do not have lead offices for geospatial efforts, questions could be raised about the degree to which other functions of government are aided by these efforts. A state government mission shared by all states that can be aided by spatial data is the management of state lands and other assets. There has been growing interest in the geospatial community about the Governmental Accounting Standards Board (GASB) and proposed changes to Statement No. 34 (GASB 34). The revised statement will have a large effect on the way governments do financial reporting concerning infrastructure assets. Geospatial data and technology use would clearly aid in this regard. State land management is a key function of state governments in any case because states own and manage approximately seven percent of the Nation's land area. Moreover, these lands are sometimes managed to produce revenue for key government functions, such as schools in many western states. In addition, as indicated above, population increases and development growth are increasing the overall interest and perceived value of public lands, many of which are owned by states. This project and others have revealed that most state governments have fragmented and perhaps antiquated land ownership data programs. Individual agencies often maintain independent records of their land holdings, and these agencies have responsibilities that cover natural resources, forestry, wildlife, parks, transportation, prisons, and other state facilities. Moreover, many of these fragmented databases are not well linked to county or other local property records.

As concluded from this query of the 12 states and other related work by Geospatial Management Associates, Michigan stands out as unique among the states in its approach to managing state-owned land because it is developing an integrated approach. The approach is known as the Statewide Land Database (SWLDB). It is also unique because it is linked to the Michigan Geographic Framework, the State's geospatial foundational data for multiple purposes. SWLDB is a cooperative effort of the Michigan Information Center and the Michigan Department of Natural Resources, and it includes core attributes for the state's landholdings, including buildings, parcels, institutions, and roads. This product is currently being used by multiple agencies throughout the State for various purposes and is under continued development, including developing data linkages with local governments. For example, a new project is developing a system to facilitate access to information about individual schools throughout the state.

Oregon is undertaking a similar effort, led by the Department of Administrative Services Facilities Division with the authority to assess agencies to pay for such a system. An RFP has just been released to hire a consultant to perform an initial needs assessment in anticipation of developing a system similar to the one described for Michigan.

Advantages

Public safety, conservation, land planning, public lands, and economic development have each proven to be a mission that both policy makers and voters have shown a strong willingness to support. While conditions, needs, and policy direction do vary by state, the overall continuing and expected growing public support for these missions is a strong driver for data development and maintenance over time. Attachment of state geospatial coordination and data development efforts to state missions has also been successful in other states not investigated here. As a result, efforts expended to associate geospatial efforts to state missions, with policy direction and oversight of such missions, can be time well spent. It is likely that much less effort would be required for state mission driven funding than some other funding options presented in this report and elsewhere.

Oregon may have an important related opportunity through the Oregon Wireless Infrastructure Replacement Initiative, which was approved by the Legislature in 2005. The cost of this initiative has been estimated to be approximately $500 million. Geospatial data is essential to this program in at least two ways. The planning of the location of wireless infrastructure must take into account the topography and ownership of land, as well as the potential and actual coverage areas of each tower. Once the wireless network is complete, geospatial data will be essential content to be transmitted to first responders and others via the network. Oregon's Geospatial Enterprise Office is involved in assisting the contractor on the initial engineering study for the statewide wireless system.

Disadvantages

An obvious disadvantage of using one or a combination of specific state missions to fund data development is that there is some risk of skewing the otherwise statewide direction and previously determined plans and priorities in order to meet the needs of the specific mission(s). Another disadvantage is that support for some missions, particularly land planning, have always been cyclical and may suffer when supporting politicians leave office. There is also an ongoing risk of the reduced availability of funding for such "extra" functions of government as public land acquisition due to the political climate across the nation and beyond. However, while these conditions exist today, public safety funding is definitely on the rise. Many E-911 problems remain to be fixed across the country to support the nation's defense infrastructure. In addition, funding has been "locked in" by the voters in some states, and successes from these efforts are expected to continue and to be increasingly revealed to the populace. And at the same time, real estate values have increased significantly in recent years, and the amount of land available for development continues to decline, both of which increase the importance of land use planning and the value of public lands.

Relevance to Georgia

We advocate the use of mission driven funds to support special projects. For example, an effort to improve community resiliency should include the creation and use of a variety of geospatial data and would likely align the missions of multiple federal, state, and local governments along with higher education and the private sector. Such projects often have great potential for funding that includes

grants and dollars from the budgets of agencies whose missions are supported by the outcomes of the project, including geospatial data creation.

Another current example exists in the state of Utah. The Director of the Utah Automated Geographic Reference Center shared during interviews conducted for this study that their GIO maintains a real time inferential GPS network with 400 subscribers (city utility, engineers, and surveyors) at $600 per year subscription. The GIO also receives $ 1 cent per telephone device to support statewide center lines and addresses for dispatch.

Assessments on Agencies

The following segments are directly quoted from 2006 Oregon Geographic Information Council *Financing Report for navigatOR*.

> *A traditional financing approach for information technology (IT) functions, both in government and industry, is to "charge" user agencies to support central IT functions and facilities. This is, in many respects, a legacy of financing large data processing mainframe operations, but this approach is well institutionalized in state governments. For example, charges for services provided by statewide IT offices are negotiated and incorporated in state agency funding arrangements with their counterpart federal agencies in order to operate many social service programs. These assessments on agencies are sometimes used to support IT policy and planning, as well as IT operations. A similar financing approach has been used by some states to support statewide geospatial data development and maintenance efforts and coordination functions. Four states with such approaches were found among the 12 investigated in this project. The four are Kentucky, Maine, Michigan and North Carolina. Details are provided below for two of these states.*

> *Maine receives funding support from approximately 20 state agencies, through Service Level Agreements (SLAs). The Maine Office of Geographic Information Systems (MEGIS) does not receive any direct appropriation for its operations nor does the State IT office, in which MEGIS is located, provide any direct support. Under the SLA arrangement, each agency annually signs an agreement and contributes a determined amount to support the operations of MEGIS. This predetermined amount is generally determined based on level of GIS activity in each agency, which ranges from $1,000 to $45,000. The total level of funding support changes each year, but for FY02, this arrangement has provided MEGIS with almost $300,000.*

> *Michigan has a similar approach that has also been found to be quite successful. The Michigan Department of Information Technology (DIT) was established as a separate executive branch department by Executive Order in 2001, with the DIT Director reporting directly to the Governor. DIT currently has 1670 employees and 1250 contract employees, with over 60 dedicated to geospatial activities in the Michigan Center for Geographic Information (CGI). The CGI is committed to supporting core statewide geospatial coordination and data development initiatives and providing geospatial application development for state agencies. The core funding for CGI is derived through assessments on seven state agencies to support the development of base data. This arrangement was made by the Budget Director to ensure adequate funding for these data initiatives. These voluntary assessments are placed in a revolving account and are renewed annually. Three smaller agencies of the seven have their contributions in their base budget to ensure that this amount is available each year. Michigan has been very successful at*

soliciting and solidifying funding support from other agencies. This success has been significantly aided by the location of the CGI in the Department of Information Technology, as well as support from the State Budget Office. CGI also receives funding from the general fund through DIT to cover many of their other activities, including data integration, application development, outreach and training, and web portal data access.

In Oregon, a total assessment of about $1.5 million has been spread among the budgets of every state agency since 2001 to support a geospatial coordination staff of four and some core data development. The amount assessed to individual agencies is based on the importance of geospatial data to the agency mission. The State Budget Director was instrumental in establishing this assessment.

Advantages

This approach has the advantage of helping ensure that a statewide geospatial coordination entity has developed and maintains support from its constituency, i.e., state agencies. This is an essential element of success for any statewide geospatial coordinator or entity, but it is particularly critical for this approach. It serves as an important driver for good management and operating practices for such entities, such as recruiting participants in developing and publicizing annual plans, as well as determining and prioritizing statewide data and other geospatial priorities. This process is an important one for any statewide service organization such as a statewide geospatial coordination entity. This process also enables state policy and agency leaders to become familiar with the services and capabilities of the coordination entity and geospatial data and technology more generally. This can, in turn, result in additional work among supporting agencies, as well as involvement by new and often nontraditional agencies which can be virtually ignored with other funding approaches. Interagency support inherent in this approach essentially serves as official endorsement for the quality of the statewide coordination entity and its work. Thus, it can be used as a building block to solicit additional funds within state government and from external sources such as federal grants and others.

Disadvantages

A key disadvantage of this approach is that it is very difficult to secure support for and effectuate this arrangement without the support of some key policy officials. The policy officials are usually political appointees, and this situation means that significant work may be required to garner interest and support by both budget officials and leaders of several departments. Such policy level interest and support is a proven key requirement of this approach despite the fact that these officials often change on schedules more frequent than even governors and legislators. While not absolutely essential, the support of the budget director is a key lesson learned from Michigan and Oregon. Any statewide geospatial office with any funding arrangement should recognize this important relationship. Moreover, this approach can require significant planning, record keeping, and logistical work to implement and maintain.

Another disadvantage of this approach is the fact that such support and detailed arrangements must be renewed at least each budget cycle and often annually. Efforts must be made to ensure that funding is available in each supporting agency, including justifying and renegotiating the workload and priorities. Michigan's statewide geospatial efforts were aided by the fact that the

Budget Director ensured that CGI support was in the base budget of some agencies, but this may not always be the case. An added problem can be agency competition. Some agencies may feel they are not being treated fairly compared to others. Their argument could be they are not getting enough services for the amount contributed from their budget or that they are not receiving an equitable level of services compared to those given to, or the funding provided by, others. This potential issue also needs to be addressed on a regular basis, particularly while determining agency assessments.

Relevance to Georgia

This model represents extreme effort related to the negotiation, administration and management of the large number of agreements that would be required. This model is not recommended for that reason.

However, there are examples of states that have successfully implemented this model. The GIO for South Carolina is located within the Department of Natural Resources. The funding for the GIOs salary and benefits is shared by 13 state agencies.

Central and Capital Funding

The following segments are directly quoted from 2006 Oregon Geographic Information Council *Financing Report for navigatOR*.

While assessments on agencies have proven useful in some states for geospatial data and technology, and also for many IT offices and functions over time, issues discussed above have, in part, helped lead to the use of central capital or other funding for some IT efforts. For example, it can be argued that policy and planning for statewide needs should not be funded by agency assessments because they then skew results. Accordingly, states sometimes fund and organizationally separate these IT policy and planning functions from IT operations. Traditional information roles, such as that of state records and libraries, are also usually centrally funded and increasingly include automated tools, such as government information locator services (GILS), which may be similarly funded.

In a report prepared for the Federal Geographic Data Committee, the following capital investment concepts were stated (Cahan, 2001):

- *Assets lasting more than one year are capital (not operating) assets.*
- *Capital Assets should be financed so as to extend their useful life & interdependencies.*
- *Annual sums spent to maintain and enhance capital assets can be leveraged & pooled with other investors in similar assets.*
- *If those annual commitments are made contractual, the contract can be pledged as collateral to finance new or replacement capital assets.*

Most recently, some states have developed special funds for innovative technology (Town 2001). Massachusetts is well recognized for being the first state to finance IT projects with authorized capital funding in the form of long-term bonds in 1992, and since then, the State has issued more than $400 million in general obligation bonds to support several large and long-term projects, including those with geospatial components.

Separation of geospatial policy and planning functions from operations also is becoming the case in some states. These states include Arkansas and Texas of the 12 states investigated here, but other states are included, as well. In broad statewide geospatial institutional investigations, the states that have two separate organizations that are both responsible for statewide geospatial functions are known as "dual states" (Warnecke 1995). In these states, coordination and, to some degree, policy and planning activities are conducted via central or general funds. Alternatively, operations such as data development, maintenance, and clearinghouse activities are funded by special funding, grants, or cost recovery.

Most states benefit in some way from the use of general appropriations funding, although few have made use of capital funding. Kentucky has benefited from the use of the capital funding approach with approximately $750,000 for each of two years. Additional use of capital funding for a Local Government Geographic Information Partnership Program (LGIP) is now proposed. This program, which would create partnership incentives for Kentucky local governments, will allow state government to take advantage of the high resolution data that are being created at the local level. While few states have used this approach, several representatives of the 50 states have expressed interest in pursuing this option. In addition, some local governments have utilized this approach.

Advantages

The advantage of this approach is to provide dedicated funds for geospatial efforts that can be expended over more than one year. This dedicated funding provides a means to create a viable foundation for future spatial activities to support spatial data development, E-Government applications, and other far reaching initiatives. The use of capital funds is strengthened by the concepts of E-Government and E-Business because many of the "infrastructure" components (hardware/software, communication and distribution, data development, data acquisition) necessary to support these concepts are not currently in place. However, the approach requires that budget and management personnel view digital initiatives as physical assets and understand that the digital infrastructure required today to access, distribute, and disseminate information will be in place and have value for longer than five years. For example, the digital version of the USGS 7.5 minute topographic quadrangles (Digital Line Graphs—DLGs) for Ohio are being used by state agencies as the foundation for their spatial initiatives. On average, the base information from which the digital spatial dataset was compiled is more than 25 years out of date.

Disadvantages

A key disadvantage of this approach is that significant effort is required to make the case for the need for capital funding and also to garner policy and political level support in this regard. As described above for mission driven funding and assessments on agencies, this approach requires support of officials who often change. In Kentucky, for example, a business case was prepared for the Secretary of the Finance Cabinet in order to successfully sell the idea of the base map being a capital item. Since that time, the person who was serving in that capacity has left State employment. Another issue is how to adequately fund data maintenance. Generally, these approaches are employed for data development, so an additional strategy and approach is usually required for such maintenance. For many agencies and jurisdictions, it may be possible to

cover maintenance costs within existing operations budgets, but some rural local governments may require ongoing financial assistance, or may need to consider working together within regional GIS support centers, to continue to provide high quality data to the enterprise.

Relevance to Georgia

In many ways, the relevance of Central and Capital funding is the same as with a dedicated fund. Central funding from capital funding or otherwise would allow the Office to spend less time in pursuit of operational funding and more time to accomplish the goals of the Office. As stated above, we do not believe that such funding is necessary for project specific efforts, with the possible exception of statewide orthoimagery and LiDAR acquisition, given the nearly universal benefit provided from these data and the savings that can be accomplished from statewide versus local acquisition.

Cost Recovery

The following segments are directly quoted from 2006 Oregon Geographic Information Council *Financing Report for navigatOR.*

> *Geospatial efforts are often viewed as an ancillary role of government, and thus, there has been a hesitancy to fund geospatial development and maintenance, particularly to meet interagency and inter-organizational needs. Many state geospatial service centers have relied on funding received for contractual services and, to a lesser degree, from the sale of hard copy or other products. As revealed in the best practices review, Minnesota, North Carolina, and Utah have three of the leading and largest state geospatial service centers. However, the relative portion of funding support from contract work in these states has diminished in recent years. These three states and others have pursued other financing options, such as general appropriation funding in Minnesota and Utah and voluntary assessments on agencies in North Carolina. It is important to note that provisions in state statutes may limit some aspects of this approach. For example, potential changes in the State Data Practices Act in Minnesota may eliminate some cost recovery practices.*

> *However, cost recovery is emerging as an approach to fund some IT services, which is also impacting geospatial efforts. Many states are investigating and implementing cost recovery methods to fund electronic government services (including data access) and to conduct transactions, such as paying taxes or acquiring building permits online (Robb 2001). Cost recovery and other non-traditional funding mechanisms are being evaluated to fund other technological enhancements and services. For example, some governments are evaluating the use of advertising on their official Web sites. Several states have established arrangements with private companies to operate their official state Web sites, including some of the states investigated in this project (e.g., Arkansas, Kansas, Maine, Tennessee, Utah, and Virginia). These public/private partnerships mean that the Web portals operate at no financial cost to the state. In these cases, most data is available at no cost on the Web, but charges are authorized for "premium services." The geospatial coordination entities in both Kansas and Virginia are testing use of such state Web portals to provide access to and use of spatial data. In the future, a charge will likely be associated with such service.*

Advantages

The advantages of this approach, once authorized, are that the funds derived are usually under control of those raising them. Also, this approach may ensure that the funds can be carried over from one year to the next, but that may not always be the case. This approach also typically requires less effort to secure and maintain policy and political support than the other approaches. In Minnesota, this approach has been found useful as an effective mechanism to fund specialized staff.

Disadvantages

Cost recovery for work can mean the best result for those organizations with funding to fund and benefit from the services of the state geospatial center. However, in a more general way, this approach may mean that statewide needs cannot be fully met because the priority is placed on paying customers. Moreover, it essentially limits the development of data as well as the access to and availability of data to others. The "digital divide" is increasingly recognized as an emerging issue concerning data, as well as access to technology. This approach essentially reinforces the difference between the "haves" and "have-nots" which in many respects is contrary to the role of government.

As stated by Minnesota, the use and value of available data can be reduced if fees are set too high. Oregon used this approach for many years in their GIS Service Center, but could not support ongoing operational expenses over time and found that it was virtually impossible to pursue an enterprise coordination approach while meeting the needs of only the paying customers. In addition, Oregon's experience indicated that GIS services needed to be closer to the agency business processes supported by the technology in order to ensure sufficient understanding of those processes to provide adequate support.

Relevance to Georgia

We believe that a cost recovery model would be very difficult to apply across multiple levels of government and therefore is not recommended. However, it might be possible to incorporate some amount of a cost recovery philosophy within a legislatively produced statue that creates and funds a GIO. This approach would require a transparent, fair, and understandable measure of the cost saving attributable to existence of a GIO for each agency from whose budget money would be taken to support the Office. We suspect that this would ultimately be even more difficult than funding the Office as an additional line item in the state budget. In addition, a major concern of a cost recovery model in Georgia is that cost recovery for fee would make it nearly impossible for the GIO to equally serve all partners and stakeholders.

We should also note that most federal granting agencies restrict the downstream sale of data that was created from their grant. For example, grants from the Environmental Data Management Committee of NOAA, the National Oceanic and Atmospheric Administration, are governed by the "NOAA Data Sharing Policy for Grants and Cooperative Agreements". That document contains language limiting the opportunity to sell data created with its grant dollars.

"All NOAA Grantees must share data produced under NOAA grants and cooperative agreements in a timely fashion, except where limited by law, regulation, policy or security requirements."

"Sharing data refers to making data visible, accessible, and independently understandable to users in a timely manner at minimal cost to users, except where limited by law, regulation, policy or by security requirements. NOAA facilities that archive data and make the data openly available should be considered first for the disposition of the data." (NOAA Data Sharing Policy for Grants and Cooperative Agreements Version 2, updated 5/29/2012, https://www.nosc.noaa.gov/EDMC/PD.DSP.php)

Likewise, the United States Geological Survey expresses a similar restriction in its FAQ document: "USGS-authored or produced data and information are considered to be in the U.S. public domain." (USGS, USGS FAQs, updated November 19, 2014, http://www.usgs.gov/faq/categories/9761/3112)

Furthermore, while a line item in the state budget is the preferred and recommended funding source for a state geographic information office, we believe that adequate funding is available for the Georgia GIO from other sources, at least initially. Two of the agencies interviewed for this study have informally indicated a willingness to partially fund the Office. Funds from these agencies, as well as financial support to cover office and administrative costs from a hosting organization, and minimal grant funding could support the Office during a period of time when the value of the Office could be demonstrated.

In addition, while we believe that revenue opportunities are available to GIOs in very limited situations, we recommend consideration be given to revenues which may be produced from enhanced access services similar to those offered or contemplated in Oregon.

The following segments are directly quoted from 2006 Oregon Geographic Information Council *Financing Report for navigatOR*.

> ***"Private data catalogue:*** *There is the opportunity to include private data providers in the GeoStor [The Arkansas enterprise geospatial architecture] "search." For example the Space Imaging Corporation has a number of high resolution satellite images that cover various parts of the state. "Footprints" showing where the data are available could be included in GeoStor. If the user selects imagery as their data search and a Space Imaging image is present in their selected area, the user would be given the option of being provided a Web link to be automatically directed to the commercial source for the actual data. GeoStor would charge the companies for inclusion in GeoStor, and/or a click through fee, and/or a data acquisition fee if data was actually purchased as a result of the GeoStor referral.*

> ***High priority data queue:*** *Generally, geospatial data is distributed by GeoStor very quickly. However, large data sets, such as aerial photographs, take much longer because of the complex processing needed. With the current system, there are three data queues and a large image request may take as long as 36-72 hours to be prepared and distributed. With planned improvements to the system, there will be eight queues and the system will be designed so that additional queues can be distributed to separate machines. A pricing structure could be developed by which users could have differential priorities for data access – in a "GeoStor Express" approach. There could be various premium versions of the standard data distribution where the availability of data in a rapid manner would be guaranteed.*

> ***Individualized server support:*** *A variant on the "GeoStor Express" would be a system where the specific user has a dedicated server allocated to their needs.*

Data storage/distribution: Many agencies will want to use GeoStor to reduce their data distribution costs within their agencies and to meet FOIA and public records requirements. The AGIO has calculated, for example, that the GeoStor automatic processing of requests for various Arkansas Highway & Transportation Department data has saved that agency nearly $100,000 (as opposed to the agency's traditional internal processing for satisfying data requests). The pricing model for this effort would have to be developed but would have two components: the first would be charges associated with preparing the data for GeoStor usage and the second would be a hosting fee based on data set sizes, processing requirements etc.

Direct connection: They now have the technical capability for selected desktop clients to "direct" connect to GeoStor over the Web. This means that the clients can directly read (not just download) data from GeoStor. Tests indicate that for most data there is essentially no latency and the data appears to be local. This ability will be of considerable benefit to various agencies. The connection will reduce the steps and time necessary to access data and would allow an agency to use GeoStor as a data distribution medium between various geographically separated offices. At the same time, the data that is being distributed could be (if desired) exposed to the public. It is possible to apply a variety of security levels to this process. It would also be possible to set up a business model where each connection could have different costs.

Web map development and Web map hosting: With GeoStor as the back end, a wide suite of Web mapping applications could be created. These applications can be divided into two cost components: (1) the development of the application, and (2) the Web hosting. Development costs vary based on the agency's needs but it would be possible to develop a standardized annual cost structure for Web map hosting. Pricing on current systems suggest that an annual fee for basic services would be in the range of $15,000 to $25,000 for each application.

Here are some examples of possible specialized Web mapping applications:

1. "The Arkansas Outdoorsman Mapping System", supported by Arkansas Game and Fish, would provide highly detailed printer-ready maps of any selected area with aerial photography and other key data.

2. "Property Assessment Mapping System". This would be an easy to use system where you could enter an address and get detailed digital photography, complete with classified soils (for farm property assessment) and other relevant data layers for appraisals and other real estate purposes.

3. "County Septic Tank Suitability Mapping System" is another option. Basically the same interface as above, but would provide an assessment based on the National Resource Conservation Service's digital soils data base.

4. "Wetland Identification Mapping System" would provide developers with the official location of wetlands, saving local governments and state agencies from having to spend time and resources answering data requests for this information."[11]

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[11] Source: Oregon Geographic Information Council. *Financing Report for navigatOR (Oregon's GIS Utility)*, 2006. Print.

An additional value added service which should be considered for generating potential revenue for the Georgia GIO is a statewide geolocator based on the statewide address point data set being developed as part of the two-year startup project. Geolocation is a process of programmatically assigning an x/y coordinate to a valid street address. Commercial geolocators are available for a fee. A "homegrown" geolocator service could potentially provide higher accuracy matches.

Government Funding Sources

The past few years have seen a decline of federal grants that fund, as their primary purpose, the development of geospatial data resources. An example of a recently successful federally funded geospatial data development directed program was the National Spatial Data Infrastructure Cooperative Agreements Program (CAP). The CAP was an annual program designed to assist the geospatial community with the implementation of the National Spatial Data Infrastructure. Between 1994 and 2013 this program supported over 700 state, local and tribal government, academic, and non-profit organization projects.

Most current state and federal agencies that offer grant funding opportunities do so within the context of specific programmatic goals that relate to the mission of the agency. This includes areas such as environmental protection, transportation, records management, housing, disaster mitigation, etc. While GIS may play a part in achieving an agency's goals, it is usually not the primary focus of the agency's programs. To be successful, grant applicants must frame their request within the context of the agency's programmatic goals. Programmatically focused support can give local governments the seed money they need to begin GIS development, or provide resources to expand existing systems.

For example, according to a report provided to the New York State Advisory Council on December 12th, 2013, supplemental funding for mitigation projects related to Hurricane Sandy resulted in appropriations of $4.2 million for USGS to collect coastal topographic and bathymetry for hurricane impact assessment and response support.[12]

- "Lidar acquisitions ... began this fall in Dutchess, Orange and Ulster Counties (2,825 mi2). End date: 05/30/2015.
- In December LIDAR acquisition began for New York City (486.5 mi2) through the USGS Coastal and Marine Geology Program (CMGP). End date: 12/31/2014.
- LiDAR acquisition is to begin (weather permitting) in Schoharie and southern Montgomery Counties that encompasses the Schoharie Creek watershed (951 mi2). End date: 05/30/2015. This Sandy response project is funded by the USGS Science Application for Risk Reduction (SAFRR) Project and the NY National Resources Conservation Service (NRCS)."

In addition, as of the writing of this report there are a few federal funding opportunities that the state may wish to pursue. There are also some opportunities that, while not currently available, may become so in the future and thus merit inclusion in this report. Appendix E describes these opportunities.

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[12] Source: http://ny.water.usgs.gov/infodata/GAC121213FederalReport.pdf

Business Model Funding Recommendations

In recognition of the information provided in this section of the report, we recommend the following business model funding elements to sustain the operation of the Geographic Information Office.

Table 5: Business Model Funding Elements for Geographic Information Office

Budget Item	Annual Cost	Funding Sources		
		Dedicated	Mission Driven	Data & Services
GIO Salary	$ 80,000	$ 80,000		
Office Admin Salary	$ 30,000	$ 30,000		
Analyst Salary	$ 60,000		$ 40,000	$ 20,000
Benefits (at 30%)	$ 51,000	$ 51,000		
Office and Equipment	$ 60,000		$ 40,000	$ 20,000
Travel	$ 10,000	$ 10,000		
Incidentals	$ 10,000	$ 10,000		
Totals	$ 301,000	$ 181,000	$ 80,000	$ 40,000
% of Total	100%	60%	27%	13%

Key Funding Considerations

- The GIO must be funded in a way that allows it to provide core services equally to all partners and stakeholders.
- The funding model must be constructed in a way that allows the GIO to be sustained throughout "high and low" funding periods. Therefore dedicated funds should be provided for the most critical budget items, including the salaries and benefits of the Geographic Information Officer and most of the funding of the Office Administrator as well as those items, such as travel, that allow the Office to function at a basic level.
- Services that are project related and mutually support the mission of a partnering agency and the GIO should be funded on a project-by-project basis. An example of a mission driven service is the production of a specific data set for an agency.
- It is probable that the GIO will encounter opportunities to provide data and services to partners, stakeholders, and the general public that are outside of the core services provided by the office, and could produce supporting funding. Examples of such services are project management, data quality review, and a statewide geolocator.
- Wherever and whenever possible, the services and data produced by the GIO should contribute to the public data holding of the office regardless of how it was funded.

Section 3: Market and Product Offering

The Georgia GIO offers a unique value proposition to the organizations that may use its services or data, including the citizens of the state. There is no other entity in the state with the sole responsibility and

authority to coordinate the collection, integration, creation, and maintenance of the state's geospatial data holdings. This provides an enormous opportunity for the state of Georgia in terms of tax dollars saved, increased quality of life, improved public safety, and increased economic prosperity. Consider the following.

- Geospatial data is pervasive. It has been estimated that 80% of all government data has a locational element.[13]
- Investment in geospatial data and technology is a good investment. No return-on-investment study concerning GIS of which we are aware has shown a negative return. On the contrary, investing in GIS data is one of the most productive expenditures that a government can make. For example:
  - In 2012 Richard Zerbe and Associates studied the benefits of GIS in King County Washington over an 18 year period (1992 to 2010) and reported that the use of GIS produced approximately $776 million in net benefits over that period.[14]

  - The Geospatial Information Technology Association (GITA) examined the geospatial technology of 99 counties, 11 state agencies, three utilities plus Iowa One Call, and consulting firms in the state of Iowa in 2007 and 2008 and determined a 20 year Net Present Value of $271 million.[15]

  - Dr. Jill Saligoe-Simmel, on behalf of the Indiana Geographic Information Council, presented a survey in 2007 to 1,521 registered users of IndianaMap, a statewide geospatial data portal, regarding their use of geospatial data. 314 respondents provided information that was used to estimate a 35:1 return-on-investment of Indiana's statewide orthoimagery product. As important, $1.7 billion worth of Indiana projects and operations were supported by the IndianaMap and more than 80% of the respondents indicated that their projects could not have been accomplished without the IndianaMap.[16]

  - According to a 2008 presentation by Michael Funaro about "Building a Successful Enterprise GIS Strategy", a geo-audit for commercial property taxes in Martin County, Florida, resulting in an increase in the county tax base by $3.5 million. In the same presentation Funaro also reported that Los Angeles County, California, automated the production of its cadastral map books using GIS. This resulted in the elimination of 200 overtime hours and 20,800 regular hours, saving taxpayers $90,000 annually.[17]

  - "A financial example is presented by the Kansas GIS Policy Board's briefing paper. It revealed that the board spent a total of $2.2 million to develop a shared database of

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[13] Source: Hwang, Julie. "Geographic Information Systems – ArcView." State University of New York. Institute of Advanced Studies. Web. http://gis.depaul.edu/shwang/teaching/arcview/module1.htm.

[14] Source: Hocking, Gary. "King County Documents ROI of GIS: $776 Million Saved During 18 Years." ArcNews. Summary 2012. Web. http://www.esri.com/news/arcnews/summer12articles/king-county-documents-roi-of-gis.html

[15] Iowa Geographic Information Council. "Final Report: Planning the Iowa Geospatial Infrastructure." 2008. Print.

[16] Source: Indiana Geographic Information Council. IndianaMap. "34:1 Return on Investment." Page A3 to A5. Print.

[17] Source: Funaro, Michael. "Building a Successful Enterprise GIS Strategy: An ROI Approach. South Central Arc User Group. 2008. Print.

geographically-related information and to coordinate the use of that information among State, Federal, and local agencies. According to the report this data set would have cost the state $11.3 million considering the usage of the shared geographic information by individual state agencies. That results in a net savings of State tax dollars in the amount of $9 million over four fiscal years (Benefit/ Cost ratio of 4:1)."[18]

- The more that data is used, the greater the return on the investment. Conversely, when open access to public data is not provided, the result is an adverse impact. Dennis Klein, in his article "Broad Use of Digital Parcel Maps and Tax Rate Growth," noted that counties with closed records did not grow as quickly as those with open records. He went on to say "However, according to these findings, if the 349 closed-records counties [studied] go to open records, they will spawn enough increased property tax revenue to pay for the maintenance of the map without charging cost recovery fees."[19]

- According the National State Geographic Information Council in their 2011 Geospatial Data Sharing: Guidelines for Best Practices[20] the number one myth is that "Organizations can pay for GIS operations through geospatial data charges."

  Reality: Overhead costs associated with receiving and managing payments; bundling and delivering data; and follow-up support to consumers can be significant. Even if adequately monetized and factored into the charge, these costs represent staff hours that could and should be utilized more efficiently to conduct core agency business.

  Perhaps more significant is the loss of the following data sharing benefits:

  - *Improved data quality as it is vetted, corrected and improved by the community*

  - *Greater opportunities to leverage resources by partnering or building upon related data*

  - *Reduced duplication of effort and competition for scarce funds*

  - *Increased numbers of complementary data resources that may support your mission*

  - *Respect for your organization as a valued data producer*

  - *Helping prevent the creation of duplicative data sets*

- We recognize a national trend toward Open Data. In a recent (January 23, 2015) example, Barney Krucoff, the GIO of Maryland, said *"Last year, Open Data legislation was passed [in Maryland] that defined "data" as "alphanumeric or geospatial." The legislation created the Maryland Council on Open Data which is now the governance body for both the geospatial and open data programs superseding separate open data and GIS committees that had previously operated under distinct Executive Orders. The Department of Information Technology (DoIT)*

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[18] Source: Silva, Eliane. "Cost-Benefit Analysis for Geographic Information System Implementation Justification: Literature Review." March 4, 1998. Print.

[19] Source: Klein, Dennis. "Broad Use of Digital Parcel Maps and Tax Rate Growth." Fair & Equitable Magazine, March 2009, Volume 7, Number 3. Print.

[20] Source: National States Geographic Information Council. "Geospatial Data Sharing: Guidelines for Best Practices." December 2, 2011. Print.

provides staff support to the new Council. DoIT is also the operational entity behind Maryland's geospatial portal and open data portal. The open data portal had previously been administered by the Governor's Office and one staff person was transferred to DoIT's Geographic Information Office as part of the functional consolidation. Recently the new Council on Open Data published its first Annual Report. **Goals for the coming year include passing legislation that reduces sales of public geospatial data in favor of free online distribution and combining the open data and geospatial portals at least from a public end user's point of view.**"[21]

Figure 6 shows that, according to the NSGIC 2013 Maturity Assessment, 75% of the states surveyed indicated that their open records laws makes data available either at no cost or at the cost of distribution.
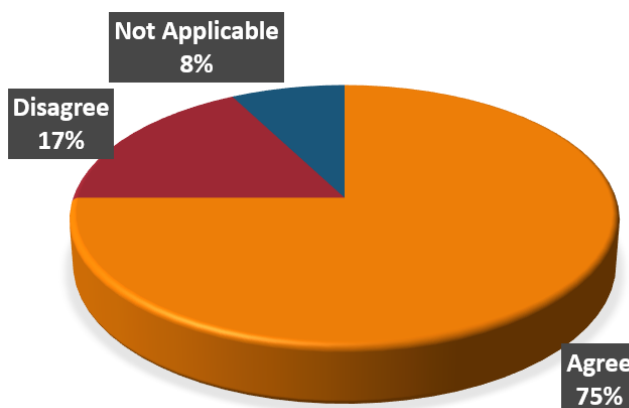
Figure 6: States with Open Records Laws that Make Data Available at No Cost or Cost of Distribution

The NSGIC study also reported that over half of the states have open records laws that do not allow copyright of data as reflected in Figure 7.
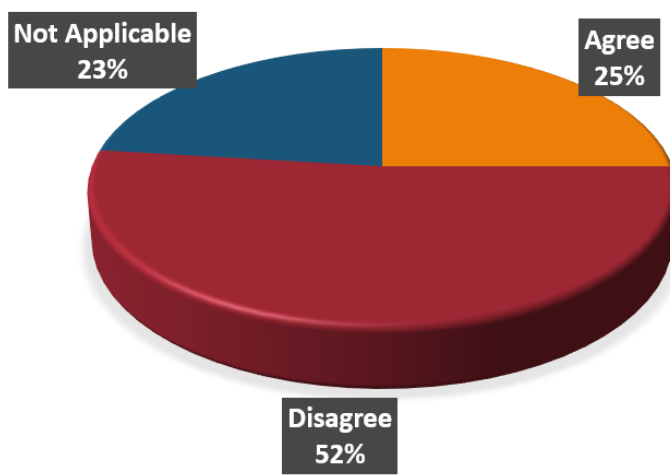
Figure 7: States with Open Records Laws that Allow Copyright of Data

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[21] This reference is from Barney Krucoff in an email to the NSGIC listserv on January 23, 2015. We added the bolded emphasis.

Based on these facts, we recommend that the Georgia GIO set the example in the state of Georgia for providing open access to geospatial data rather than seeking revenue from geospatial data sales. We further recommend the consideration of a blended funding approach that includes a dedicated state budget line item covering the operational costs of the office, voluntary contributions from organizations benefiting from a centralized statewide GIS, targeted project funding (funding for specific projects that are not considered part of normal operational efforts), grant funding, and seeking revenue from value added services such as enhanced access and a for-fee statewide geocoder.

O.C.G.A. 50-29-2, which contains language that allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities. In our opinion, the language which allows fees for geospatial data and services should be revoked.

Section 4: Customer Base

Customer Base

Given the responsibilities that have been proposed in this document, as well as those identified in the terms of the two year grant provided by the U.S. Economic Development Administration, we can envision the customer base that will be served by the Georgia GIO. These customers can be organized into the following groups:

- State government agencies, especially those agencies with duties related to transportation, the environment, natural resources, health and safety, and human services.
- Regional governments, as liaisons between local and state government agencies
- Local government, especially those agencies within local government with duties related to tax rolls, transportation, the environment, natural resources, health and safety, and human services.
- Higher education focused on geospatial technologies
- Private sector (for profit and not-for profit)
- The general public

We do not anticipate that these customers will be "paying customers" but will instead be consumers and beneficiaries of the geospatial data and technologies offered by the GIO. As discussed in various places in this report, we do not believe that a business model of self-sufficiency predominantly or completely based on revenue from the sale of geospatial data or technology is advisable or even possible given the goals defined in this report for the Office. However, these organizations may also be data contributors. For example, regional or local government entities are the data stewards creating and maintaining land parcels while also benefiting from other data and services. The beneficiaries and contributors are represented in Table 6.

Table 6: Services and Data Benefits by Organization Type

This chart represents services and data that may benefit various organizations. Benefits are identified with "X". In addition, potential data contribution from an organizaton is represented with "O".

Organization	Coordination	Grant Management	Technical Assistance	Centralized Data Hosting	Centralized Application Hosting	Land Parcels	Address Points	Buildings And Structures	Land Use	Ortho Imagery	Elevation Data (LiDAR)	Geodetic Control	Land Assessment	Transportation (Roads, Highways, Railway, Airports, Ports)	Governmental Boundaries	Hydrography	Land Cover	Soils	Social Assets
	Services					Pilot Project Data				Additional Data									
Georgia Department of Agriculture	X	X	X	X		X			X	X	X					X	X	X	
Child Support Services	X	X	X	X	X		X			X					X				X
Governor's Office for Children and Families	X	X	X	X	X		X			X					X				X
Georgia Department of Community Affairs	X	X	X	X			X	X		X				X	X	X			X
Georgia Department of Economic Development	X	X	X	X		X		X	X	X				X	X	X	X		X
Georgia Emergency Management Agency	X	X	X	X		X	X			X	X		X	X	X	X			X
Family and Children Services	X	X	X	X	X		X	X		X					X				X
Georgia Department of Human Services	X	X	X	X	X		X			X					X				X
Georgia Department of Natural Resources	X	X	X	X	X	X			X	X	X			X	X	X	X		
Governor's Office of Planning and Budget	X	X	X	X				X		X					X				X
State Properties Commission	X	X	X	X	X	X		X		X					X				
Georgia Regional Transportation Authority	X	X	X	X	X					X					X	X	X		
Georgia Soil and Water Conservation Commission	X	X	X	X		X			X	X	X			X		X	X	O	
Georgia Department of Transportation	X	X	X	X		X	X		X	X	X	O	X	O	X	X	X	X	
Regional Government	X	X	X	X	X	O	O	X	O	O	O	X	X	O	O	X	X	X	X
Local Government	X	X	X	X		O	O	X	O	O	O	O	X	O	O	X	X	X	X
Higher Education	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Private Sector	X	X	X	X		X	X	X	X	X	X	O	X	X	X	X	X	X	X
General Public	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X		X

Organizations that will benefit from land parcel, point address, land use, and building and structure data will be the earliest beneficiaries since development of these data have been included in the goals of the GIO pilot project.

The value of each data set can be viewed from a number of perspectives. Ortho imagery, more commonly called aerial photography, and transportation data are very valuable data sets because they can benefit nearly every group in the list. Social asset data, while benefiting fewer organizations, are extremely beneficial to organizations that are responsible for providing human services. [22]

Brand Identify and Brand Image

We believe that one of the elements that will contribute to the success of the GIO is establishing a clear brand identity. Equally as important is brand image. Brand Identity, according to Cambridge Dictionaries Online[23] is

> *"A set of ideas and features that a company wants people to connect in their minds with its products or brand."*

Brand identity establishes how an organization wants a brand's name, communication style, logo and other visual elements to be perceived by consumers. The components of a brand are created by the organization itself, making the brand identify the way that the organization wants itself to be perceived by consumers, not necessarily how it is actually perceived. Brand identity is closely connected with brand image. Cambridge Dictionaries Online defines this term as:

> *"A set of features and ideas that customers connect in their minds with a particular product or brand."*

In other words, brand identity is how an organization wants to be perceived while brand image is how the organization is actually perceived. A gap between brand identity and brand image would be an indication that the GIO is out of touch with the needs of the stakeholders that it serves.

One of the interviews conducted in preparation of this report was with Bill Johnson, The Geographic Information Officer for the state of New York. In 2013 he conducted a series of phone interviews with selected GIOs around the nation to obtain their advice and guidance on how to be successful as a Geographic Information Officer. With regard to the topic of branding, he stated that

> *'Although this was not specifically cited by all, it came up in many of the interviews. All of the GIOs spend significant time talking to stakeholders to build awareness of the benefits of a statewide approach to GIS. Since GIS is a broad subject area and can have many meanings and interpretations,*

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[22] Examples of social asset data include information about social services, human services facilities, and quality of life data.

[23] Source: Cambridge Dictionaries Online. Web. http://dictionary.cambridge.org/us/

the brand provides something recognizable to market the initiatives. By attaching it to each of the various GIS projects and capabilities being pursued by the GIO, a common identity is established for what might otherwise appear to be disparate elements. Examples include Minnesota GeoCommons, Kansas One-Map, Maryland i-Map, California GeoPortal, Oregon NavigatOR, and Arkansas GeoSTOR. Other branding ideas include a "GIO seal of approval" to denote authoritative status on data meeting certain standards, and a conscious decision by the California GIO to preface the name of every GIO project and initiative as "State of California…" so that search results will make it easy to distinguish his projects from other similarly named projects.

One of the ways that brand identity can be established is through an effective logo. The members of the team that created this report are all from the state of Indiana. We feel that this state has experienced considerable success in its GIS development and that this is in part due to establishing a successful brand identity that has been closely aligned with brand image. The GIO for the State of Indiana was established in 2007. That office has consistently worked in partnership with the Indiana Geographic Information Council (IGIC), a non-profit organization, established in 2000, that is led by a group of elected representatives from government, private sector, academia and other sectors. These entities collaborate on the strategic development, collection and distribution of hundreds of layers of geographic information for the state. The IndianaMAP (www.indianamap.org) is the portal through which this information is freely made available to all stakeholders. The IndianaMAP started in 2002 with a public/private partnership that created a data repository for studies related to an extension of I-69. It grew into the 'GIS Atlas for Indiana' and was renamed to its present form, the IndianaMAP, in 2008. The name of this resource, along with the current logo that accompanies it, were strategically selected in order to clearly promote the idea that the IndianaMAP is the key source of mapped information for the State of Indiana.

Figure 8: IndianaMAP Logo

It was felt that many people, especially members of the public, might not be able to easily understand the types of services and products offered by the GIO or the Indiana Geographic Information Council based solely on the names of those organizations. That issue was addressed by strengthening the brand identity through an easily understandable name and logo. When promoting the availability and value of GIS in Indiana we consistently reference the IndianaMAP. This product is marketed as 'the largest publicly available collection of Indiana geographic information system (GIS) map data.' The entities that create and maintain the IndianaMAP, guided by the leadership of the Geographic Information Officer in close collaboration with IGIC, are well served by this strategy. We encourage a similar strategy be considered for the State of Georgia.

Related to the importance of an effective brand name and logo is the usability of the access point through which stakeholders interact with GIS. Early efforts in the State of Indiana to create a web portal resulted in a relatively difficult to navigate interface. This was due in part to technological limitations and in part to ineffective design strategies. As a result, there was fairly limited use of this resource. These early efforts were represented by a series of layers that could be checked on or off and that often

generated cluttered, unattractive maps that were not very informative. In the most recent version of the IndianaMAP a number of user friendly features have been adopted. For example, the hundreds of layers of information on the IndianaMAP are grouped into topic areas presented in a 'Layer Gallery' so that they can be quickly discovered.
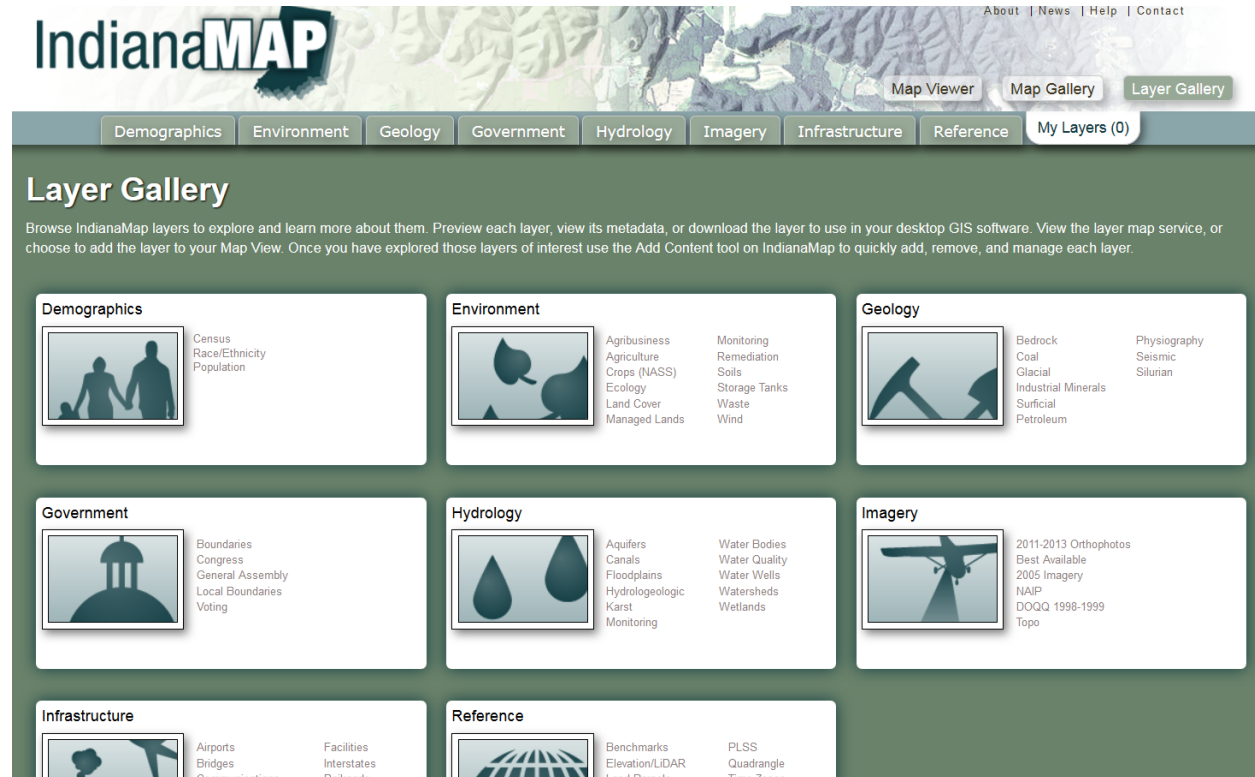

Figure 9: IndianaMAP Layer Gallery[24]

Another example of the usability of the IndianaMAP is the availability of professionally designed thematic maps. The IndianaMAP offers the ability to add individual layers to a map based on the needs of the user. This is a relatively common feature of GIS mapping portals. However, during the design phase of the IndianaMap it was determined that many users are interested in similar information. By creating thematic maps that are designed based on popular topics, the IndianaMAP makes this information readily available. Just as important, these thematic maps are not static images. They access the most recent data available and thereby provide current information for the topics they address. This feature brings users back to the IndianaMAP on a recurring basis so that they can access the most up-to-date information. Appendix F reports on views by theme in 2014.

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[24] IndianaMap. Web. http://Indianamap.org
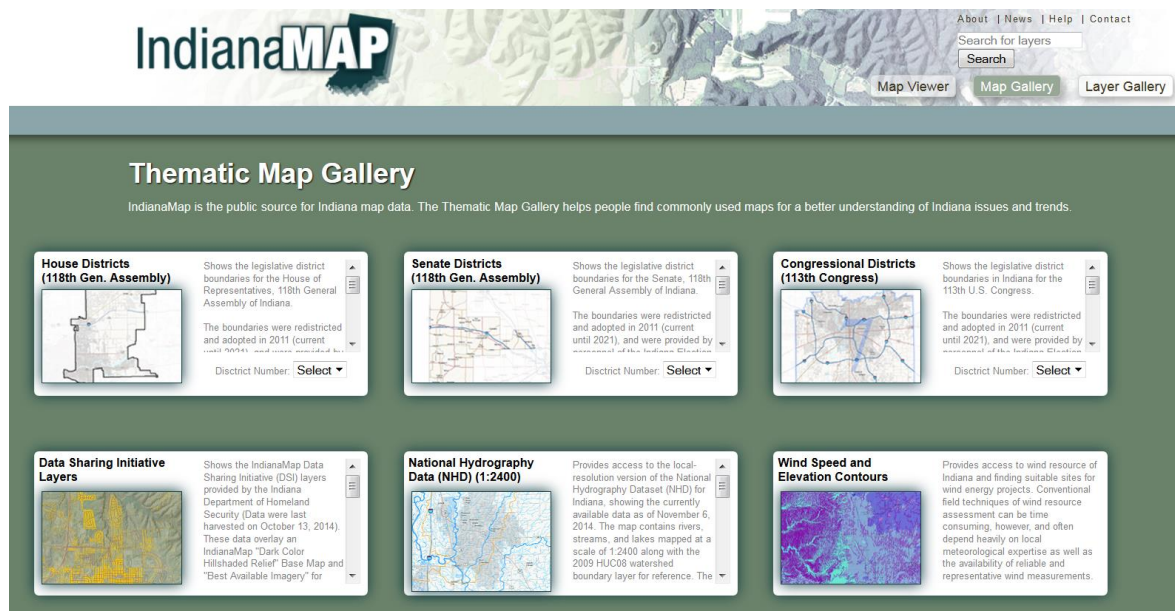
Figure 10: IndianaMAP Thematic Map Gallery

Another example of a themed map service is offered by the state of Maryland. Their website offers a range of themes such as population growth, alternative fuel site locations, and a viewer for the Chesapeake Bay Restoration efforts.

Figure 11: Maryland Themed Map Gallery[25]

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[25] Source: Maryland State. MD iMAP: Maryland's Mapping and GIS Data Portal. Web.
http://www.imap.maryland.gov/Pages/map-gallery.aspx

As noted above, brand image is equally as critical as brand identity. One of the desired characteristics for a Geographic Information Officer that was consistently identified in nearly all of the interviews – both state and national - conducted for this study was strong communication skills. It is critical that the Geographic Information Officer maintain ongoing communication with the stakeholder community to ensure that the brand image of the GIO in the stakeholder community is consistent with the brand identity that is the goal of that office. While experience suggests that personal communication – especially through phone calls and personal visits– are most effective, other instruments are also available for this purpose. One example includes occasional surveys that seek input from data consumers and stewards regarding the effectiveness of the GIO as well as suggestions for improvement.

Based on stakeholder feedback, it is important that the GIO address any concerns that arise, as much as practically possible, in order to ensure that the gap between brand identity and brand image remain minimal. The IndianaMAP represents a successful effort to achieve that goal. The current design of the IndianaMAP is a direct result of the incorporation of user feedback in to the design process. As a result of a combination of effective promotion and ongoing design updates, user hit rates of the IndianaMAP have risen steadily as shown in the Table 7.

Table 7: IndianaMAP 2014 Use Rates[26]

	2012	2013	2014
Total Users	13,977	50,121	58,995 (an 18% increase since 2012)
Total Page views	42,580	278,673	337,780 (a 21% increase since 2012)
Dwell time	2:12	4:08	5:10

Another example of a state that has enhanced its brand identity through the Web is Tennessee. In addition to their map portal, they have also developed a series of Location Based Services (LBS). These services draw in a diverse range of seemingly unrelated stakeholder communities. The factor that these communities have in common is spatial location. The state GIS layers provide the means to create LBS products that can be informed by that data. Examples include a property map viewer, a locator for childcare providers, tax rate lookup, a locator for healthcare professionals and facilities, a locator for registered sex offenders, voter registration information lookup, and a locator for civil war battlefields.

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[26] Source: Indiana Geological Survey, January 2015.

Figure 12: Tennessee Office for Information Resources GIS Applications Portal

We also believe that the Geographic Information Officer should prepare an annual report on the status of geospatial data development, maintenance and sharing efforts within the state. This report should be made available on the Web for public consumption. It should also be presented in a conference venue such as a state GIS conference that will provide the opportunity to reach as many critical stakeholders and beneficiaries of spatial data resources as possible.

Section 5: Financial Pro Forma

Revenue by Product and Service

Given the recommendations that we have made in other parts of this report, we do not anticipate revenue being generated from the sale of data. However, a supplementary amount of revenue may be produced from services. This section of the report will provide some referential revenue ranges for the products mentioned. We urge caution when considering revenue production from services. It is vital

that the resources spent on the delivery of those services do not jeopardize the ability to meet the responsibilities of the Office. As stated in the 2006 Oregon report,

> *"Cost recovery for work can mean the best result for those organizations with funding to fund and benefit from the services of the state geospatial center. However, in a more general way, this approach may mean that statewide needs cannot be fully met because the priority is placed on paying customers. Moreover, it essentially limits the development of data as well as the access to and availability of data to others. The "digital divide" is increasingly recognized as an emerging issue concerning data, as well as access to technology. This approach essentially reinforces the difference between the "haves" and "have-nots" which in many respects is contrary to the role of government. As stated by Minnesota, the use and value of available data can be reduced if fees are set too high."* [27]

We therefore recommend consideration of services that require little or no effort to maintain after initial development. A statewide batch geocoder based on integrated point address and centerline data, as previously mentioned, is a good example of an important resource that could provide revenue but would not consume significant resources after initial deployment. Batch geocoding is particularly valuable to businesses, such as banking and insurance companies, because it supports critical decisions based on the location of customers, assets, or events. Geocoding is used in analyzing markets, assessing risk, and targeting clients. Commercial batch geocoders are available from companies including Esri, HERE, ThinkGeo, and others. The product proposition offered by ThinkGeo requires a license for the geocoder and a server license. Together, these represent annual revenues to ThinkGeo in the amount of about $3,000.

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[27] Source: Oregon Geographic Information Council. *Financing Report for navigatOR (Oregon's GIS Utility)*, 2006. Print.

Figure 13: January 2015 HERE Geocoding Pricing Plan[28]

The costs of a geocoder from HERE, formerly Ovi Maps from 2007 to 2011, and Nokia Maps from 2011 to 2012, and now a Nokia business unit, range from $99/month at a starter level and go to $1299/month at the professional level.

Figure 14: January 2015 ThinkGeo Geocoding Pricing Plan[29]

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[28] Source: Here. Web. https://developer.here.com/get-started#/10134037.
[29] Source: ThinkGeo. Web. http://thinkgeo.com/map-suite-developer-gis/geocoder/#geo-pricing.

Geocoding can be performed using Esri ArcGIS Online and is paid using credits. The cost to install ArcGIS Online for 100 users is about $18,000 initially and includes 17,500 credits. About 40 credits are consumed to geocode 1000 addresses. Other plans, with more or fewer users and credits, are also available from Esri.

We believe that a web-based statewide batch geocoding application could be created using a three tier system of 1) point addresses, 2) road centerlines with address ranges, and 3) TIGER road centerlines. We feel that such a geocoder, if based on local data and refreshed quarterly, would provide benefit to businesses enough to warrant a $50 to $100 per month subscription fee. The audience includes businesses such as marketers, banks, insurance companies, health and hospital related companies, and government agencies providing health and human services. According to Bud Walker and Abby Garcia Telleria, Melissa Data Corp, "The benefits of high-accuracy address geocoding are manifold and serve a diverse set of applications such as market segmentation, demographics, spatial, dispatched services, nearest location queries, sales districting and zoning, tax jurisdictions, elections, etc.,"[30] The cost of creating a statewide geolocating service will be negligible after the completion of statewide address and street centerlines with address ranges. Each of these data are critical and provide compelling benefits without regard to their contribution to a geolocating service. In other words, addresses and centerlines need to be built based on their own merits, but will also contribute to a geolocating service. We recommend that a free version be provided to the public in which only one address could be geocoded per session. Although centerlines from Georgia Department of Transportation do not currently include address ranges, we believe that adding address ranges is an appropriate goal for the Office.

Other services and associated revenue might include:

Service	Fee
Grant administration	10% of the grant
Project Management	10% to 20% of the total project cost
Specialty/Custom Work	Direct cost of resources used multiplied by two. This include sales and administration costs.

Cost By Product or Service

We believe that there are two basic categories of costs associated with the products and services that have been contemplated in this document. The first is for those products and services which are within the normal and expected responsibilities of the Office. These include coordination, education, and data integration, such as integrating parcels from counties, for example. For this category, the cost is equal to the total operating cost of the office, which we estimate to be $300,000 to $400,000 per year.

The second category of costs is for those products and services which cannot be produced within the normal and expected responsibilities of the office. Examples of this category of costs include project involving contractors, such as the acquisition and delivery of orthoimagery and LiDAR, and requests for specialty products such as the production of a custom hard copy map.

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[30] Source: Bud Walker and Abby Garcia Telleria, "Connecting the Dots: Why Geocoding is Critical for Businesses", https://www.melissadata.com/featurearticles/geocoding-is-critical-for-businesses.htm, accessed 2/15/2015.

We recommend that most of the data products presented in Table 6 be viewed as products for which the collection, integration, and distribution are ultimately within the normal responsibilities of the Office, but not all at the beginning. For example, we suggest the following timeline for bringing data into the Office:

1. 2-Year Pilot that includes collecting, integrating, and distributing point addresses, land parcels, land use, building inventory.
2. Post Pilot Years 1-4 that includes adding the collection, integration, and distribution of geodetic control, parcel assessment data, governmental boundaries, transportation, and hydrography (National Hydrography Dataset or better).
3. Post Pilot Years 5-10 that includes the collection, integration, and distribution of land cover, soils, social assets, and other data sets determined to be important.

We also recommend adding statewide orthoimagery and LiDAR in Years 5-10, but only after project funding has been identified. These costs are above and beyond operational costs. For a point of reference, and based on the market best known to the authors, the current market in Indiana, 4-band orthoimagery costs are about $45 per square mile for 12-inch resolution or $110 per square mile for 6-inch resolution based on county wide acquisition, and less for a statewide acquisition. LiDAR costs for 1.5-meter average post spacing is about $108.00 per square mile based on countywide acquisition.

Section 6: Other Considerations

SWOT Analysis

An evaluation of Strengths, Weaknesses, Opportunities, and Threats (SWOT) is a strategic planning tool that helps create an understanding of the status, shortcomings, and future direction of an organization.

- **Strengths** are factors or conditions that might be considered a favorable attribute of something that positively impacts GIS development and operations.
- **Weaknesses** are factors or deficiencies that might are clear problems or inhibitors that work against effective use, access or expansion of GIS technology and data.
- **Opportunities** are internal or external conditions or resources that support GIS and that can be leveraged to enhance GIS program improvements.
- **Threats** are internal or external forces that must be overcome to accomplish goals.

The following SWOT analysis has been prepared to help guide the state of Georgia toward a sustainable and successful Geographic Information Office. We have organized this information into five categories:

- GIS Governance
- Geographic Data Development and Stewardship
- GIS Technical Infrastructure
- GIS Education and Technical Expertise
- Funding

	Strengths	Weaknesses	Opportunities	Threats
GIS Governance				
High-level GIS Mandate and Oversight	• Planning Act of 1989 (See Appendix D) • House Bill 169 – Established the Georgia Geospatial Advisory Council (GGAC) (See Appendix D) • OCGA 50-8-7(b)(1) – Georgia Database and Network (See Appendix E) • OCGA 50-29-2 – commercializes geospatial data (See Appendix D) • OCGA 50-8-7(b)(1), OCGA 36-70-4(a) and OCGA 36-70-4(c) – Basis for DCA Role to support GIO • OCGA 50-25-1(b)(13) and, OCGA 50-25-1(c), (See Appendix E)	• State law in OCGA 50-29-2, commercializing what should otherwise be public geospatial information, is detrimental to the public health and safety of citizens subjected to such practices as well as counter-productive to intergovernmental decision making and business.	• State legislation is needed to formally assign responsibilities and authority to the Georgia Geographic Information Office. • GIS briefings to state legislative committees	• Political changes at the governor and cabinet level that may be unfavorable to supporting GIS. • Lack of awareness at the executive and legislative level of the benefits of GIS. • O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.
Statewide GIS Leadership and Management	• Georgia has a rich history of GIS collaboration extending back into the early 1990s. Current organizations that facilitate statewide GIS collaboration include the GGAC and GISCC (See Appendix C)	• Lack of sustainable funding for a State GIS Coordinator. • Lack of funding to fully sustain a State GIS Clearinghouse. • Limited data sharing among GIS organizations.	• Sustainable funding for a State Geographic Information office, led by an effective Geographic Information Officer • Improve GIS data sharing among organizations – both inventory and access. • Utilize grassroots momentum and support • Increase funding opportunities for the State	• Lack of clear, defined roles and responsibilities for each statewide GIS body (GISCC, GIO, GGAC, RCN, etc.) • Lack of collaborative leadership. • Lack of management support for staff to serve on GIS committees. • O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.

	Strengths	Weaknesses	Opportunities	Threats
Geographic Data Development and Stewardship				
GIS Programs in State, Regional and Local Agencies	• Georgia has a long history of GIS in its state agencies extending back into the 1990s. • Most state agencies (DOT, DOH, GEMA and others) currently have well established GIS programs, resources and staff. • Most of the Regional Commissions have trained GIS personnel on staff. • Most local governments have GIS functions. (See Appendix C) • The regional commissions have a close working relationship with many of the counties.	• GIS funding for state agencies was significantly reduced in the 2000s. For the most part this funding has not been restored. • GIS expertise is limited in some Georgia counties. (See Appendix C)	• Centralize GIS coordination through the Geographic Information Office. • Certain data layers, such as building inventory, could be developed through a collaboration between the GIO and the regional commissions. • Create multiple opportunities to support counties that currently have limited GIS function through creation and sharing of statewide data layers.	• Lack of statewide GIS data and resources will continue to limit the potential that exists in counties that lack GIS functions. • Without centralized leadership for geospatial leadership, the potential continues to exist to duplicated data and efforts related to GIS at all levels of government in the state. • There is not currently a viable model in place to distribute and share geospatial data. • O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.
Cadastral (parcel)	• ITOS is working with the counties in Georgia to create a statewide parcel layer. ITOS is also working with the counties to ascertain the status of their CAMA systems – type, completeness, etc.	• No state agency routinely collects and normalizes parcel data – although this is currently being done by ITOS. • CAMA data may not be equivalent in quality and completeness in all counties.	• Translators can be created that integrate parcel and CAMA data. . • Increased tax equity as a result of the proper identification, location and value of parcels of property • Increased public safety by avoidance of or proper mitigation strategies in flood zones, and by greater accuracy in 911 systems and addressing	• A few counties are unwilling to share their data or have data that is not currently in a GIS format. • O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.

	Strengths	Weaknesses	Opportunities	Threats
Land Use	• Parcel data, combined with CAMA information can be used to create land use data. This process is being completed as part of the RCN/GIO Grant.	• There is currently no statewide land use map.	• A statewide land use layer will enable more effective emergency management, transportation and urban planning and potentially promote economic development.	• Unrealized benefit of this data layer will continue until a GIO is in place. • O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.
Geodetic Control	• The private sector surveyor community in the state is increasingly aware of the importance and benefit of GIS. The creation of a geodetic control layer will be greatly facilitated by this group.	• Georgia does not currently have a State Geodetic Advisor	• The existence and availability of this data layer will facilitate the creation and maintenance of land parcels. • The creation of a geodetic control layer will be greatly facilitated by land surveyors.	• Unrealized benefit of this data layer will continue until a GIO is in place. • O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.

	Strengths	Weaknesses	Opportunities	Threats
Addresses	• CAMA and Parcel data can be combined to create a statewide address database	• Current translators do not support inclusion of the address components – census block, physical, mailing address, etc - required to create a statewide address layer.	• The methodology that was employed in creating the building inventory for the 2012-13 hazard risk assessment process completed by DCA can be enhanced to incorporate address components needed to create a statewide address layer. This layer could be used to update the Census Bureau's Master Address File mailing list. • Creation of a statewide address layer is consistent with the NSGIC Addresses for the Nation initiative.	• Counties that are unwilling to share their data will not be included in the statewide address layer. • O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.
Orthoimagery	• Statewide NAIP imagery was obtained in the early 2009 • Selected counties have imagery that is as recent as 2014.	• The last statewide photography update is out of date. • Counties could be saving considerable money if imagery was acquired for multiple counties at the same time.	• Statewide photography can be generally be more cost effectively developed that photography obtained by individual counties. County buy-up opportunities can also be made available for those counties that need higher resolution photography.	• Lack of funding • O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.
LiDAR derived Elevation / Digital Terrain Data (DEM)	• LiDAR derived DEM exists in selected counties.	• There is presently no statewide LiDAR derived DEM	• Statewide LiDAR derived DEM will contribute to a variety of opportunities. Examples include enhanced flood and hazard planning, economic development, etc.	• Lack of funding • O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.

	Strengths	Weaknesses	Opportunities	Threats
Hydrography	• The National Hydrography Dataset (NHD) is available for use as a starting point to improve data about the state's surface waters.	• A steward has not been identified for this data.	Several states are in the process of improving the NHD using local resolution data. Georgia can take advantage of "lessons learned" from those states and from USGS.	• O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.
Transportation	• GDOT has a statewide road database	• The GDOT road layer has no road names (only numbers) or address ranges. No private roads are in the GDOT layer.		• O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.
Government Jurisdiction and Administrative Boundaries				• O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.
Land Cover / Vegetation				• O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.

	Strengths	Weaknesses	Opportunities	Threats
Telecommunications				
Public Safety / Critical Facilities	• GEMA maintains a statewide database of essential facilities as well as government owned buildings.		• The GEMA data has value for emergency management and other types of planning.	• O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.
Geology and Mineral Resources				• O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.
Soils	SSURGO data is available for all but seven counties[31]			• O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.
Demographics	• Selected state agencies such as the Department of Public Health collect and use demographics data.	• Demographics data is not readily available from a single source.	• Census and other demographics data can be a valuable resource for a variety of planning and economic development activities.	• O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.

[31] Source: Natural Resource Conservation Service. "Soil Data Availability Map." October 7, 2014. Print.

	Strengths	Weaknesses	Opportunities	Threats
GIS Technical Infrastructure				
Network Accessibility		• Some counties are lacking IT		• O.C.G.A. 50-29-2, which allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities.
Web based GIS Portal and Clearinghouse	• The Georgia GIS Data Clearinghouse was also established in the late 1990s and hosted and operated by the university system Board of Regents.	• Funding for the Georgia Data Clearinghouse was the victim of budget cuts in the 1990s. This resource is lacking updates of data and functionality and thus not realizing its potential.	• An effective Web-based GIS portal will be a key resource for effectively sharing and distributing GIS data. • A well designed GIS web portal can contribute to establishing brand identify for the Office of Geographic Information.	• Lack of an effective Web-based GIS portal will significantly hinder the effective distribution of GIS data.
GIS Education and Technical Expertise				
GIS Training and Professional Development	• There are multiple continuing education (i.e. workshop) opportunities for GIS professional education in Georgia. These are made available through the higher education community as well as the consulting community. • GIS degree programs are available in Georgia higher education institutions • K-12 Esri Program	• Although training resources exist in the state, they are not being applied to any significant degree outside of higher education.	• State and regional training opportunities possibly facilitated in collaboration with the GIO and / Or the GISCC. •	• Training can be cost prohibitive. • Failure to support ongoing staff training would jeopardize the ability of the GIS community to sustain GIS operations and fully leverage the potential of GIS in the state.

	Strengths	Weaknesses	Opportunities	Threats
Funding				
Funding	• There is current funding support in place from the regional commissions to develop selected GIS layers and translators and to hire a geographic information officer. This is supported by a two year $200,000 grant from the US Economic Development Administration from September 2014 to September 2016 • There is interest among several state agencies in helping to sustain a GIO by sharing in funding requirements.	• A lack of sustainable funding sources is the single most serious impediment to the effective statewide coordination of geospatial information in Georgia.	• Sustained funding will make it possible to significantly enhance the level of geospatial data development, collaboration, and sharing in Georgia. • A GIO can become the recognized authority for facilitating and entering into agreements with federal and other funders that can support the GIS goals of the state.	• Lack of sustained funding will result in a continuation – or potential reduction – in the status of GIS in the State of Georgia.

Recommended Georgia State Government Actions

We advocate that legislation be created or modified to:

- Assign responsibilities and authority to the Georgia Geographic Information Office.
- At a minimum, create a non-reverting budgeting vehicle that can be used to accept funding and pay out project and other costs. Better, put at least 80% of the operating costs of the Office in the state budget each year.
- O.C.G.A. 50-29-2, which contains language that allows governments to sell GIS data and services, represents a significant threat to the concept of open data and sharing geospatial data across or between government entities. The language which allows fees for geospatial data and services should be eliminated. We understood from the interviews that the majority of those interviewed would support such a change.
- Change the language of the statutorily created Geospatial Advisory Committee to assign the role of chair to the Geographic Information Officer.

First 90 Days

We strongly recommend that much of the first 90 days after the GIO is hired be spent meeting with stakeholders and partners throughout the state. Ultimately the success of the GIO will depend on the number and quality of relationships that are established with the Georgia GIS community and the decision makers that facilitate and coordinate the activities that occur within it.

We also recommend that the GIO pursue the development of Data Sharing agreements for data presented in Table 5 that exists in the state.

Search, Hiring, and Advisory Committee

We recommend the creation of a search and hiring committee that is composed of representatives of stakeholder and partner organizations, including local and state government representatives, Regional Commissions, and the hosting organization.

We also recommend that this committee continue to serve for two years as an advisory body to the GIO. It could ultimately transition into the Geospatial Technical Advisory Committee, mentioned elsewhere in the report, to informally counsel the GIO on issues as requested by the GIO.

Pilot Project Area

Given that the GIO will have significantly less than the two years originally envisioned for the pilot project, we recommend consideration of a reduced geographic scope in regard to the creation of the four data sets assigned for completion. It is likely to be more feasible to work with three or four of the Regional Commissions and the counties that they support, rather than the entire state, to produce the four data sets in the pilot project time period.

Additional Partnerships to Consider

The development of Georgia Statewide GIS programs is likely to benefit by leveraging the resources of national stakeholder groups as well as other states. We encourage the pursuit of collaborations with these organizations.

National States Geographic Information Council

The National States Geographic Information Council is advocating a number of nationwide geospatial data programs and policy issues. We recommend that consideration should be given to whether these efforts can be leveraged to support geospatial advancements in Georgia.

So why are federal government legislation and programs so important to the geospatial community? The recently published "Virtual America - A Stimulating Technology" [32] advocacy document from NSGIC provides some real-world examples of how the geospatial industry "owes its very existence to enlightened policy decisions by the United States government over the past 30 years." What would our nationwide geospatial fabric look like without the U.S. Census Bureau DIME and TIGER mapping efforts, or the U.S. Air Force Navstar GPS program, or the GIS Enterprise and Internet software innovations that have been developed and funded through numerous federal programs?

Learning from the past, NSGIC wisely calls for leaders to take the next steps to create new geospatial policy to help address today's challenges. Geospatial data and technology can support our national efforts to fix our infrastructure, climate, heath care, homeland security, health pandemics, energy independence, economic/mortgage crisis, and many other problems we face today. In the NSGIC document they identify and advocate three opportunities that the federal government can take to provide almost immediate assistance to help address these problems:

- Develop and fund a reoccurring national imagery program (Imagery for the Nation -IFTN) with partnership and buy-up options for all levels of government.
- Remove Title 13 privacy restrictions on U.S. Census Bureau and U.S. Postal Service address points, and work with state and local governments to create and maintain a national address file.
- Revamp the FGDC and NSDI to create an inclusive partnership that empowers equal representation from all levels of government, the private sector and public to eliminate "silos" of information, duplication of efforts and saves everyone money.

If the federal government were to act on these three initiatives it could be very helpful to Georgia's current state and local government geospatial initiatives. With reoccurring nation-wide geospatial data programs in place with base level funding for two key framework data layers like orthophotography and address points, the benefits would be quickly realized and become apparent to everyone. With a revamped FGDC and NSDI that promotes partnerships and stewardship at all levels of government, the development of additional nationwide framework layers like elevation data, parcels, road centerlines,

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[32] Source: http://www.nsgic.org/docs/Briefing_IFTN_T13_Gov.pdf#_blank

local boundaries, local-resolution hydrography, height-modernization, and critical infrastructure would not be far behind.

USGS Geospatial Liaison Program

The United States Geological Survey (USGS) Geospatial Liaison Network consists of USGS Geospatial Liaisons housed in National Spatial Data Infrastructure (NSDI) Partnership Offices across the nation. These liaisons and offices perform numerous partnership related functions in support of the NSDI, The National Map and Geospatial One Stop. They represent and coordinate National Geospatial Program initiatives in state, local, and other federal agencies, cultivate and maintain long-term relationships, and develop partnerships and supporting agreements. The Georgia USGS Geospatial Liaison is Gary Merrill.

Federal-State Best Practices

In "A Distributed Model for Effective National Geospatial Data Management: Building a National Data Sharing Infrastructure,"[33] it was noted that there are a multitude of best practices employed with the support of federal agencies in collaboration with local and state government that have resulted in the creation of geospatial data. This paper cites the National Agriculture Imagery Program (NAIP), National Broad Band Map, Indiana Data Sharing Initiative, NSGIC "For the Nation" Initiatives, USGS Liaison Program, Homeland Infrastructure Foundation-Level Data (HIFLD), US Army Core of Engineers Silver Jackets, and Western States Contracting Alliance (WSCA) as examples of best practices that can be applied toward a national data sharing model. These practices reflect a partnership approach between local, state, and federal government toward creating a nationwide, credible and current collection of geospatial resources that can serve a wide range of interests. We believe that the recommendations in this report, if implemented, will successfully position Georgia achieve its own goals as well as to be a valuable partner in the national geospatial community.

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[33] Mickey, K., Sparks, J., & Worrall, P. (2013). A distributed model for effective national geospatial data management or building a national data sharing infrastructure. Washington D.C: National Institute of Building Sciences, Multihazard Mitigation Council. Print.

Glossary

Term	Definition
Computer-Aided Mass Appraisal (CAMA)	Generic term for any software package used by government agencies to help establish real estate appraisals for property tax calculations.
The Institute of Government's Office of Information Technology Outreach Services (ITOS)	Center at the University of Georgia that provides a range of services including digital map production, local government GIS services and web application development.
Georgia Geospatial Advisory Council (GGAC)	The Georgia legislature passed, and Governor Perdue signed, House Bill 169 sponsored by Senator Earl "Buddy" Carter (R-1st District). Senator Carter worked collaboratively with Representative David Knight (R-126), pertinent Conferees, the Association County Commissioners of Georgia (ACCG), Georgia Environmental Protection Division (EPD), Georgia Association of Assessing Officials (GAAO) and members of the Georgia GIS Coordinating Committee (GISCC), including Newton County GIS and GIS@GTRI, to arrive at legislation that created the Georgia Geospatial Advisory Council (GGAC). This legislation became effective July 1, 2010.
GIS Coordinating Committee (GISCC)	The GISCC, formed by the Information Technology Policy Council (ITPC) in July of 1998, is the official statewide advisory and coordinating body for geospatially-related activities, pending legislative approval.

Further, the GISCC is intended to facilitate the collaboration, communication, planning, budgeting, acquisition, utilization and archiving of all state, regional and local geospatial resources.

The GISCC leads and encourages continued development and use of the Georgia Spatial Data Infrastructure (GaSDI) which feeds the National Spatial Data Infrastructure (NSDI), defined as the "technology, policies, and people necessary to promote geospatial data sharing throughout all levels of government, the private and non-profit sectors, and academia." GISCC members include representatives from all levels of government, private industry, educational institutions, non-profit and private groups. The GISCC leadership positions include Chair; Vice Chair, Outgoing Chair (new in 2008) and Chairs of the following three standing subcommittees: Strategic Plans and Policy, Education and Outreach, and Framework Management. |
| National States Geographic Information Council (NSGIC) | The National States Geographic Information Council (NSGIC) is an organization committed to efficient and effective government through the prudent adoption of geospatial information technologies (GIT). Members of NSGIC include senior state geographic information system (GIS) managers and coordinators. Other members include representatives from federal agencies, local government, the private sector, academia and other professional organizations. |
| National Geospatial Program | The National Geospatial Program provides leadership for United States Geological Survey geospatial coordination, production and service activities. The Program engages partners to develop standards and produce consistent and accurate data through its Geospatial Liaison Network. Operational support is provided by the National Geospatial Technical Operations Center. These and other Program activities that are essential to the National Spatial Data Infrastructure (NSDI) are managed |

Term	Definition
	as a unified portfolio that benefits geospatial information users throughout the Nation.
Geospatial Liaison Network	The United States Geological Survey (USGS) Geospatial Liaison Network consists of USGS Geospatial Liaisons housed in National Spatial Data Infrastructure (NSDI) Partnership Offices across the nation. These liaisons and offices perform numerous partnership related functions in support of the NSDI, The National Map and Geospatial One Stop. They represent and coordinate National Geospatial Program initiatives in state, local, and other federal agencies, cultivate and maintain long-term relationships, and develop partnerships and supporting agreements.
National Spatial Data Infrastructure (NSDI)	Executive Order 12906, issued in 1994, launched the NSDI which is the technologies, policies, and people necessary to promote sharing of geospatial data throughout all levels of government, the private and non-profit sectors, and the academic community.

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Appendix A – Georgia GIS Sustainability Study Interview Questionnaire for State Interviews

Overview

The Georgia Regional Commission Geospatial Network and Geospatial Information Office (GRCGN/GIO), along with affiliate partners from state agencies, will establish and maintain a two year pilot program to coordinate and partner with local governments, as well as with state and federal government agencies, to compile critical base maps and information needed by all levels of government and business. The principal goal is to compile these geospatial information products for the immediate consumption and benefit of government leaders and professionals. The data compilation is focused on critical base maps, including:

1)   A Georgia Parcel Map and Database
2)   A Georgia Building Inventory Map and Database
3)   A Georgia Address Map and Database
4)   A Land Use Map and Database

The Polis Center will research, analyze and develop sustainability model(s), requirements, options and recommendations to sustain this effort as well as a Georgia Regional Commission Geospatial Network and Geospatial Information Office (GRCGN and GIO). Your assistance is requested to help us understand your requirements for using this basemap information, and your current effort to obtain and manipulate the data. Additionally we would like to understand any challenges that you may have experienced when attempting to coordinate with other federal, state, or local agencies, and the potential roles that the GRCGN/GIO should play to improve GIS coordination in the state. We would appreciate your cooperation in participating in an interview. Sample questions are shown in the survey below.

1. Please describe your organization and your role within the organization.

2. How does your organization currently acquire, manage, organize and disseminate critical basemap layers from or with other state, local or federal agencies? How much effort is expended annually in performing this work?

3. What other statewide basemap layers do you think would be valuable and how might they benefit your operations?

4. What products do you generate that require these basemap layers?

5. What grants (FEMA, EPA, HUD, etc.) that you have supported or may support in the future utilize these products?

6. What ideas do you have for improving data developing and data sharing in your state?

7. What partnerships exist and/or should be developed to enhance and support GIS in Georgia?

8. What are three organizations with which you most often collaborate?

9. What do you perceive as the greatest potential that can be realized by having a Geographic Information Officer?

10. How should a Geographic Information Officer relate to state government, local government and other stakeholders?

11. Where organizationally do you think a Geographic Information Officer should be located?

12. What do you think the biggest challenge will be in establishing a statewide Geographic Information Office?

13. What do you think will be the biggest challenge to success for a Geographic Information Officer?

14. What should the role of a statewide geospatial coordinating body include?

15. Who should be involved in a statewide geospatial coordinating body?

16. What mechanisms occur to you for financing GIS activities in Georgia?

Appendix B: Indiana GIO Legislation

IC 4-23-7.3
 Chapter 7.3. Indiana GIS Mapping Standards

IC 4-23-7.3-1
"Data exchange agreement"
 Sec. 1. As used in this chapter, "data exchange agreement" means an agreement concerning the exchange of any GIS data or framework data.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-2
"Electronic map"
 Sec. 2. As used in this chapter, "electronic map" has the meaning set forth in IC 5-14-3-2.
As added by P.L.198-2007, SEC.2. Amended by P.L.248-2013, SEC.1.

IC 4-23-7.3-3
"Framework data"
 Sec. 3. (a) As used in this chapter, "framework data" means common electronic map information for a geographic area.
 (b) The term includes the following:
 (1) Digital orthophotography.
 (2) Digital cadastre.
 (3) Public land survey system.
 (4) Elevation.
 (5) Geodetic control.
 (6) Governmental boundary units.
 (7) Water features.
 (8) Addresses.
 (9) Streets.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-4
"Fund"
 Sec. 4. As used in this chapter, "fund" refers to the Indiana mapping data and standards fund established by section 19 of this chapter.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-5
"GIS"
 Sec. 5. As used in this chapter, "GIS" refers to geographic information systems.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-6
"IGIC"
 Sec. 6. As used in this chapter, "IGIC" refers to the nonprofit entity known as the Indiana Geographic

Information Council, or its successor organization.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-7
"Political subdivision"
 Sec. 7. As used in this chapter, "political subdivision" has the meaning set forth in IC 36-1-2-13.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-8
"State agency"
 Sec. 8. As used in this chapter, "state agency" has the meaning set forth in IC 4-13-1-1.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-9
"State data center"
 Sec. 9. As used in this chapter, "state data center" refers to the state data center established under IC 4-23-7.1.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-10
"State GIS officer"
 Sec. 10. As used in this chapter, "state GIS officer" refers to the individual appointed under section 13 of this chapter.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-11
"Statewide base map"
 Sec. 11. As used in this chapter, "statewide base map" means an electronic map of Indiana consisting of framework data for Indiana.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-12
"Statewide data integration plan"
 Sec. 12. As used in this chapter, "statewide data integration plan" means a plan:
 (1) to integrate GIS data and framework data developed and maintained by different units of the federal, state, and local government into statewide coverage of framework data; and
 (2) that includes details for:
 (A) an inventory of existing data;
 (B) stakeholder data requirements;
 (C) identification of data stewards;
 (D) data standards and schema, costs, work flow, data transfer mechanisms, update frequency, and maintenance; and
 (E) identification of appropriate data sharing policies and mechanisms to facilitate intergovernmental data exchange, such as data exchange agreements.

As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-13
State GIS officer; appointment; qualifications
 Sec. 13. (a) The governor shall appoint an individual as the state GIS officer.
 (b) The individual appointed by the governor must be an experienced geography and mapping
professional who has:
 (1) extensive knowledge of the principles, practices, terminology, and trends in GIS, spatial data,
analysis, and related technology; and
 (2) experience in administration, project management, policy development, coordination of services,
and planning.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-14
State GIS officer; duties
 Sec. 14. The state GIS officer shall do the following:
 (1) Function as the chief officer for GIS matters for state agencies.
 (2) Review and either veto or adopt both the:
 (A) state's GIS data standards; and
 (B) statewide data integration plan;
 as recommended by the IGIC. If either of the recommendations is vetoed, the state GIS officer shall
return the recommendation to the IGIC with a message announcing the veto and stating the reasons for
the veto. If the IGIC ceases to exist or refuses to make the recommendations listed in this subdivision,
the state GIS officer may develop and adopt state GIS data standards and a statewide data integration
plan. The standards and the plan adopted under this subdivision must promote interoperability and
open use of data with various GIS software, applications, computer hardware, and computer operating
systems.
 (3) Act as the administrator of:
 (A) the state standards and policies concerning GIS data and framework data; and
 (B) the statewide data integration plan.
 (4) Enforce the state GIS data standards and execute the statewide data integration plan adopted under
subdivision (2) through the use of:
 (A) GIS policies developed for state agencies; and
 (B) data exchange agreements involving an entity other than a state agency.
 (5) Coordinate the state data center's duties under this chapter.
 (6) Act as the state's representative for:
 (A) requesting grants available for the acquisition or enhancement of GIS resources; and
 (B) preparing funding proposals for grants to enhance coordination and implementation of GIS.
 (7) Review and approve, in accordance with the statewide data integration plan, the procurement of
GIS goods and services involving the state data center or a state agency.
 (8) Cooperate with the United States Board on Geographic Names established by P.L.80-242 by serving
as the chair of a committee formed with the IGIC as the state names authority for Indiana.
 (9) Publish a biennial report. The report must include the status and metrics on the progress of the
statewide data integration plan.
 (10) Represent the state's interest to federal agencies regarding the National Spatial Data
Infrastructure.
 (11) Serve as the state's primary point of contact for communications and discussions with federal
agencies regarding framework data, spatial data exchanges, cost leveraging opportunities, spatial data

standards, and other GIS related issues.
 (12) Facilitate GIS data cooperation between units of the federal, state, and local governments.
 (13) Promote the development and maintenance of statewide GIS data and framework data layers associated with a statewide base map.
 (14) Approve and maintain data exchange agreements to which the state data center or a state agency is a party to increase the amount and quality of GIS data and framework data available to the state.
 (15) Use personnel made available from state educational institutions to provide technical support to the:
 (A) state GIS officer in carrying out the officer's duties under this chapter; and
 (B) IGIC.
As added by P.L.198-2007, SEC.2. Amended by P.L.3-2008, SEC.11.

IC 4-23-7.3-15
Publication and access requirements; public disclosure
 Sec. 15. The publication and access requirements of this chapter do not apply to data that would otherwise be exempt from public disclosure under IC 5-14-3-4(b)(19).
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-16
Dissemination of GIS data and framework data
 Sec. 16. With money from the fund, the state GIS officer, through the data center, the IGIC, and the other organizations, shall do the following:
 (1) Ensure that there are adequate depositories of all GIS data and framework data obtained by a state agency.
 (2) Acquire, publish, store, and distribute GIS data and framework data through the computer gateway administered under IC 4-13.1-2-2(a)(5) by the office of technology and through the state data center. The state GIS officer may also provide access through the IGIC and other entities as directed by the state GIS officer.
 (3) Integrate GIS data and framework data developed and maintained by state agencies and political subdivisions into the statewide base map.
 (4) Maintain a state historical archive of GIS data, framework data, and electronic maps.
 (5) Except as otherwise provided in this chapter, provide public access to GIS data and framework data in locations throughout Indiana.
 (6) Provide assistance to state agencies and political subdivisions regarding public access to GIS data and framework data so that information is available to the public while confidentiality is protected for certain data from electronic maps.
 (7) Develop and maintain statewide framework data layers associated with a statewide base map or electronic map.
 (8) Publish and distribute the state GIS data standards and the statewide data integration plan adopted under section 14(2) of this chapter.
 (9) Subject to section 20 of this chapter, make GIS data, framework data, and electronic maps available for use by the Indiana Business Research Center.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-17
Coordination with state educational institutions
 Sec. 17. The state GIS officer shall coordinate with state educational institutions to do the following:
 (1) Promote formal GIS education opportunities for full-time and part-time students.

(2) Provide informal GIS learning opportunities through a series of seminars and noncredit concentrated classes provided throughout Indiana.

(3) Coordinate research assets for the benefit of Indiana by maintaining inventories of the universities' academic and technical GIS experts, data and technology resources as provided by the universities, and research interests for collaboration to pursue research grant opportunities.

(4) Implement an outreach network to Indiana political subdivisions to enhance communication and data sharing among state government, political subdivisions, and the business community.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-18
Provision of services by state educational institutions to the state and political subdivisions

Sec. 18. (a) Except as provided in subsection (b), a state educational institution may not bid on contracts to provide photogrammetry services or framework layer data conversion services for the benefit of a state agency or political subdivision. This section shall not be construed to prohibit the purchase of any of the following by a state agency or political subdivision from a state educational institution:

(1) GIS data or framework data.

(2) Data previously created by the state educational institution as part of the educational, research, or service mission of the state educational institution.

(b) If there is a lack of qualified bids on contracts referred to in subsection (a) by entities other than state educational institutions, the state agency or political subdivision may, with the advice of the state GIS officer, solicit bids from state educational institutions.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-19
Indiana mapping data and standards fund

Sec. 19. (a) The Indiana mapping data and standards fund is established for the following purposes:

(1) Funding GIS grants.

(2) Administering this chapter.

(b) The fund consists of the following:

(1) Appropriations made to the fund by the general assembly.

(2) Gifts, grants, or other money received by the state for GIS purposes.

(c) The state GIS officer shall administer the fund.

(d) The expenses of administering the fund shall be paid from money in the fund.

(e) The treasurer of state shall invest the money in the fund not currently needed to meet the obligations of the fund in the same manner as other public money may be invested. Interest that accrues from these investments shall be deposited in the fund.

(f) Money in the fund at the end of a state fiscal year does not revert to the state general fund.
As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-20
Political subdivision control of GIS data and framework data provided to the state; data exchange agreement

Sec. 20. (a) Except as provided in subsections (b), (c), and (d), a political subdivision maintains the right to control the sale, exchange, and distribution of any GIS data or framework data provided by the political subdivision to the state through a data exchange agreement entered into under this chapter.

(b) A political subdivision may agree, through a provision in a data exchange agreement, to allow the sale, exchange, or distribution of GIS data or framework data provided to the state.

 (c) Subsection (a) does not apply to data that is otherwise required by state or federal law to be provided by a political subdivision to the state or federal government.

 (d) As a condition in a data exchange agreement for providing state GIS data or framework data to a political subdivision, the state GIS officer may require the political subdivision to follow the state GIS data standards and the statewide data integration plan when the political subdivision makes use of the GIS data or framework data as provided by the state.

As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-21

Statute not to be construed to restrict standards for GIS hardware or software for political subdivisions; "Buy Indiana Presumption" to be observed

 Sec. 21. (a) Nothing in this chapter shall be construed to permit the IGIC, the state GIS officer, or the state data center to recommend or restrict standards for GIS hardware or software that a proprietary vendor provides to any political subdivision.

 (b) It is the intent of the general assembly in enacting this chapter to promote high technology enterprise and employment within Indiana. To the extent practicable, the "Buy Indiana Presumption" required by Executive Order 05-05, shall be observed with respect to all procurement decisions related to this chapter, so long as Executive Order 05-05 is in effect.

As added by P.L.198-2007, SEC.2.

IC 4-23-7.3-22

Publication and access requirements do not supersede IC 5-14-3

 Sec. 22. The publication and access requirements of this chapter do not supersede IC 5-14-3.

As added by P.L.198-2007, SEC.2.

Appendix C: GIS Functions Provided Within Jurisdiction [34]

GIS Functions Provided Within Jurisdiction
Method of Service Provision Reported by Counties

Legend

- ☐ No Report Filed **
- ☐ Local Government provides GIS
- ☐ Agreement with other local government
- ☐ Agreement with Regional Commission
- ☐ Agreement with Private Provider
- ☐ Combination of the above
- ☐ No GIS

** as of map creation date
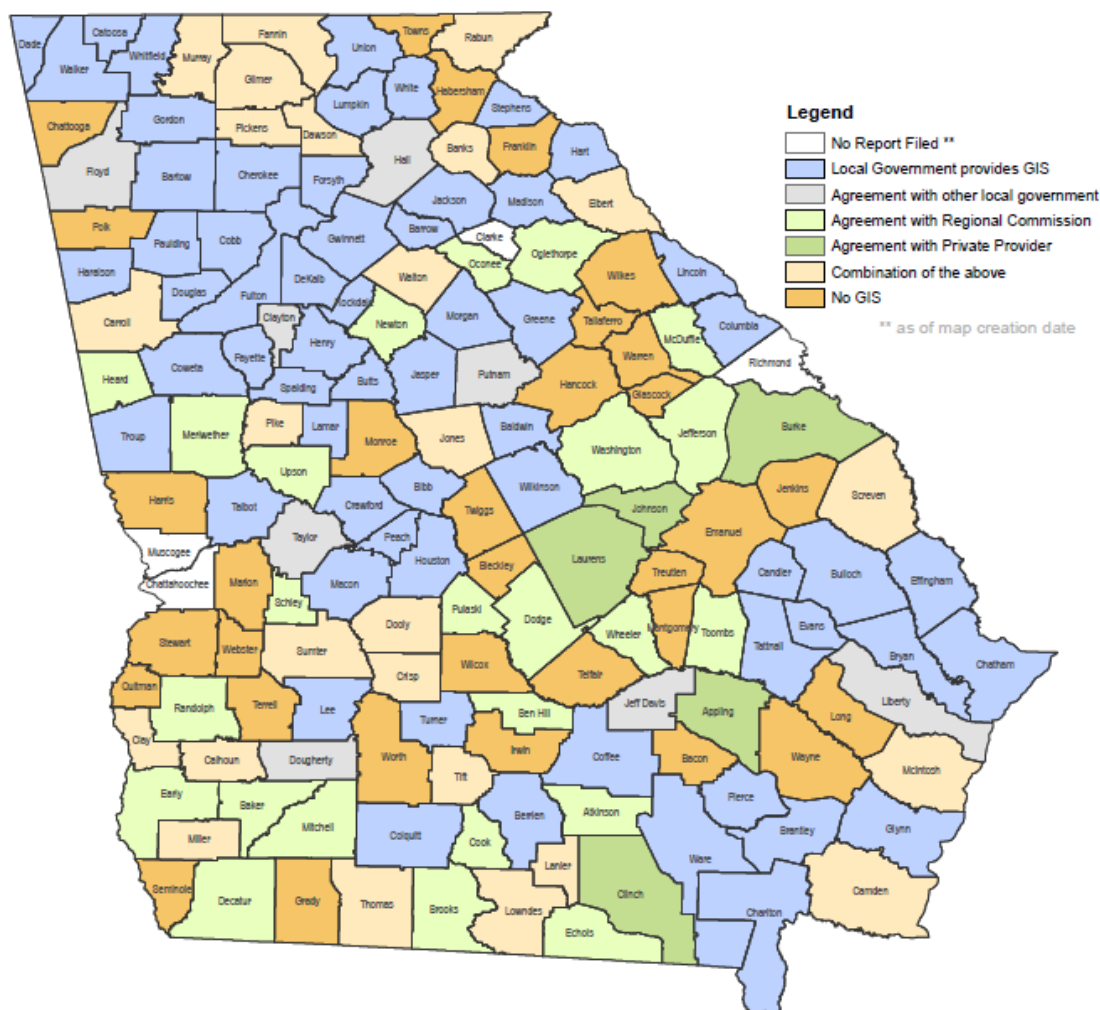
February 2015

Data source: 2014 Government Management Indicators (GOMI) survey,
Question I-1-104 Management functions undertaken by your government.

GOMI is a mandated annual survey required of all Local Governments
in Georgia by O.C.G.A. 36-81-8.

Georgia Department of
Community Affairs

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[34] The information on this map is self-reported by the counties.

Appendix D: Relevant Georgia Legislation

Georgia Code Commercializing Local GIS

O.C.G.A. 50-29-2

Authority of public agencies that maintain geographic information systems to contract for the provision of services; fees; contract provisions (a) Notwithstanding the provisions of Article 4 of Chapter 18 of Title 50, a county or municipality of the State of Georgia, a regional commission, or a local authority created by local or general law that has created or maintains a geographic information system in electronic form may contract to distribute, sell, provide access to, or otherwise market records or information maintained in such system and may license or establish fees for providing such records or information or providing access to such system. (b) Any fees or license fees established pursuant to subsection (a) of this Code section shall be based upon the recovery of the actual development cost of creating or providing the geographic information system and upon the recovery of a reasonable portion of the costs associated with building and maintaining the geographic information system. The fees may include cost to the county, municipality, regional commission, or local authority of time, equipment, and personnel in the creation, purchase, development, production, or update of the geographic information system. (c) Any contract authorized by subsection (a) of this Code section shall include provisions that: (1) Protect the security and integrity of the system; (2) Limit the liability of the county, municipality, regional commission, or local authority for providing the services and products; (3) Restrict the duplication and resale of the services and products provided; and (4) Ensure that the public is fairly and reasonably compensated for the records or information or access provided. (d) A county, municipality, a regional commission, or local authority may contract with a private person or corporation to provide the geographic information system records or information or access to the system to members of the public as authorized by this Code section.

Basis for DCA role to provide operational framework services for GIO

Georgia Planning Act of 1989 – 50-8-3

(b) The department [Department of Community Affairs] shall serve as the principal department in the executive branch of state government for local government affairs. The department shall perform the state's role in local government affairs by carrying out the state's duties, responsibilities, and functions in local government affairs and by exercising its power and authority in local government affairs. Without limiting the generality of the purposes served by the department, the department shall:

(1) Develop, promote, sustain, and assist local governments;

(2) Provide a liaison between local governments and other governments, including the state government and the federal government;

(3) Act as the state's principal department for local government affairs and local government services generally and for programs, functions, and studies in local government affairs and local government services and act as the coordinator on the state government level for such programs, studies, and functions provided by the department and for those provided by others;

(4) Act as the state's principal department for developing, promoting, maintaining, and encouraging coordinated and comprehensive planning;

(5) Develop, promote, sustain, and assist local governments in the performance of their duties and responsibilities under law to their citizens, including among such duties and responsibilities of local governments coordinated and comprehensive planning; the provision of infrastructure and other public works and improvements; the development, promotion, and retention of trade, commerce, industry, and employment opportunities; the provision of transportation systems; and the promotion of housing supply;

OCGA 50-8-7(b)(1)

"The department shall coordinate and participate in compiling, and other state agencies and local governments shall participate in compiling, a Georgia data base and network to serve as a comprehensive source of information available, in an accessible form, to local governments and state agencies. The Georgia data base and network shall collect, analyze, and disseminate information with respect to local governments, regional commissions, and state agencies. The Georgia data base and network shall include information obtained or available from other governments and information developed by the department. To maintain the Georgia data base and network, the department shall make, and shall coordinate with other state agencies and local governments in making, comprehensive studies, investigations, and surveys of the physical, social, economic, governmental, demographic, and other conditions of the state and of local governments and of such other aspects of the state as may be necessary to serve the purposes of the department. The department shall make available the Georgia data base and network, or provide access to the Georgia data base and network, to other state agencies, local governments, members of the General Assembly, and residents of the state;"

OCGA 36-70-4(a)

"Each municipality and county shall automatically be a member of the regional commission for the region which includes such municipality or county, as the case may be."

OCGA 36-70-4(c)

"Each municipality and county shall participate in compiling a Georgia data base and network, coordinated by the department, to serve as a comprehensive source of information available, in an accessible form, to local governments and state agencies." (State of Georgia, 2014)

Basis for GTA role to provide operational framework services for GIO

Georgia Technology Authority's enabling legislation

OCGA 50-25-1(b)(13)

"Technology enterprise management" means methods for managing technology resources for all agencies, considering the priorities of state planners, with an emphasis on making communications and sharing of data among agencies feasible and ensuring opportunities of greater access to state services by the public.

OCGA 50-25-1(c)

"The purpose of the authority shall be to provide for technology enterprise management and technology portfolio management..."

It also states more specifically that the purpose of the authority is to provide for:

(1) The public interest in providing ready access to public state information for individuals, businesses, and other entities;

(2) The public interest in providing ready access to state information for other governmental entities, so as to enhance the ability of such other governmental entities to carry out their public purposes;

(3) Fair and adequate compensation to the state for costs incurred in generating, maintaining, and providing access to state information;

(4) Cost savings to the state through efficiency in the provision of public information; and

(5) Such other factors as are in the public interest of the state and will promote the public health and welfare. (State of Georgia, 2014)

Basis for OPB role to provide operational framework services for GIO

OCGA 45-12-173

Office to promote state development; duties of Governor; employment of personnel; furnishing of advice and assistance by other state officials (a) The Office of Planning and Budget shall perform the function of promoting the orderly growth and development of the state through the proper planning and programming of the affairs of state government. The Governor shall be ex officio director of state planning. (b) The Governor, through the Office of Planning and Budget, shall make available such planning and programming service, technical assistance, information, and advice as specified in this Code section and Code Sections 45-12-174 through 45-12-176 to departments, agencies, and institutions of state government, to the General Assembly, and to local and joint units of government and other public bodies as may be appropriate to achieve the purposes of this Code section and Code Sections 45-12-174 through 45-12-176. (c) The Governor, through the Office of Planning and Budget, shall encourage comprehensive and coordinated planning and programming of the affairs of the state government. He may inquire into the methods of planning and program development in the conduct of the affairs of state government; he may prescribe for adequate systems of records for planning and programming purposes; and he may prescribe the institution and uses of standards for effective planning and programming. (d) The Governor shall prepare and submit to the General Assembly a development program for the consideration and review of the General Assembly. A program budget report shall satisfy this requirement. The development program shall be submitted within five days after the organization of the General Assembly for review with the budget document. (e) The director of the Office of Planning and Budget is authorized and directed to employ fully qualified professional, technical, and clerical personnel as required to carry out the duties prescribed in this Code section and Code Sections 45-12-174 through 45-12-176. (f) The Attorney General, the state auditor, and such other state officials as shall be called upon shall render such advice and assistance and furnish such information to the Office of Planning and Budget as may be requested and needed.

Appendix E: Federal Grant Examples

Funding Organization: National Oceanic and Atmospheric Administration (NOAA)

Title: FY 2014 – 2015 Broad Agency Announcement

Submission Due Date: Full applications must be submitted to Grants.gov up by midnight EDT on September 30, 2015

Amount: Funding for potential projects in this notice is contingent upon the availability of Fiscal Year 2014 and Fiscal Year 2015 appropriations. The award period will generally be for a one-year period.

URL: http://coast.noaa.gov/funding/index.html?redirect=301ocm

Summary: The purpose of the notice on the NOAA website is to request applications for special projects and programs associated with NOAA's strategic plan and mission goals, as well as to provide the general public with information and guidelines on how NOAA will select proposals and administer discretionary Federal assistance under this Broad Agency Announcement (BAA). This BAA is a mechanism to encourage research, education and outreach, innovative projects, or sponsorships that are not addressed through our competitive discretionary programs.

This grant has four program priorities. These are (1) Climate Adaptation and Mitigation; (2) Weather-Ready Nation; (3) Healthy Oceans; and (4) Resilient Coastal Communities and Economies. While each of the four program priorities could benefit from the development of quality geospatial data resources – including those prioritized in the Georgia pilot project – the fourth priority area, Resilient Coastal Communities and Economies specifically states 'Geospatial services will support communities, navigation, and economic efficiency with accurate, useful characterizations, charts and maps, assessments, tools, and methods.

Requirements: Eligible applicants may be institutions of higher education, nonprofits, commercial organizations, international or foreign organizations or governments, individuals, state, local and Indian Tribal governments. Cost sharing is not a requirement for this grant unless it is determined that a project can only be funded under an authority that requires matching/cost sharing funds. Additional details about format and submission content requirements are provided in the grant announcement.

Funder: Environmental Protection Agency

Title: Exchange Network Grant Program

Submission Due Date: The submission date for the 2015 grant was in November of 2014. However, this program has been available since FY 2002 and has awarded approximately $171 million to all 50 states, five territories and 87 federally recognized tribes. It is currently expected that it will be available in 2016 as well.

Amount: From FY 2002 through FY 2014 this program has awarded approximately $190 million to all 50 states, five territories and 87 federally recognized tribes. According to their website, in FY 2014 EPA expected to award about $10,000,000 for 40 to 50 assistance agreements for traditional Phase 2 (or Phase 1) Exchange Network projects of up to $500,000 each and an additional $1.4 million for three to four partnership assistance agreements for Exchange Network projects related to E-Enterprise of up to $500,000 each. Availability of 2016 funding is currently unknown and is dependent on appropriations for the grant program.

URL: http://www.epa.gov/exchangenetwork/grants/index.html

Summary: The Exchange Network Grant Program provides funding to states, territories, and federally recognized Indian tribes to support the development of the National Environmental Information Exchange Network. The primary outcome expected from Exchange Network assistance agreements is improved access to, and exchange of, high-quality environmental data from public and private sector sources. According to the Fiscal Year 2015 National Environmental Information Exchange Network Grant Program Solicitation Notice, 'Exchange Network partners use Web services and standard data formats to electronically report, share, and integrate both regulatory and non-regulatory environmental information. Web services and machine-readable data formats allow for automated machine-to-machine communication over the Internet. EN partners can use those services to automate reporting requirements; integrate data sets for analysis, power mobile and desktop applications; support more efficient business processes; and be consistent with EPA's Open Data Policy 1…The Exchange Network Grant Program provides funding to states, tribes, inter-tribal consortia and territories to develop and implement Web services, Web Application Programming Interfaces (APIs), and associated tools and applications that support efficient, open, and timely access to environmental data. Grantees will be required to register their work products in EPA's Reusable Component Services (RCS) database to promote discovery and reuse by other EN partners. The focus of EE is on improving environmental outcomes. E-Enterprise is an initiative to fully integrate and streamline the way government protects the environment. Ideal E-Enterprise related projects for EN grants are those that improve efficiency, modernize programs, and reach across organizational boundaries. '

Requirements: 2015 submission requirements indicated that eligible applicants included states, US Territories, federally recognized Indian tribes and native villages and intertribal consortia of federally recognized tribes. Other entities such as regional air pollution control districts and some public universities could also apply for assistance if they were agencies or instrumentalities of a state under applicable state laws. Local governments could also apply if they could demonstrate that they were instrumentalities of the state. No cost sharing or matching fund requirement was associated with this program in 2015. Additional details about format and submission content requirements are provided in the 2015 grant announcement and should be reviewed if and when a 2016 grant announcement is made available by the EPA.

Funder: US Department of Housing and Urban Development

Title: National Disaster Resilience Competition

Submission Due Date: March 15, 2015

Amount: $820 million

URL: http://portal.hud.gov/hudportal/HUD?src=/program_offices/administration/grants/fundsavail/nofa14/ndrc

Summary: According to the HUD website noted above 'This grant awards supplemental disaster recovery [Community Development Block Grant] CDBG funds competitively for resilient recovery activities. The Disaster Relief Appropriations Act, 2013 (PL 113-2) included funds for disaster recovery from major disasters declared under the Stafford Act (42 U.S.C. 4121 et seq.) in 2011, 2012, and 2013.

HUD has not previously allocated such funds competitively, instead employing Federal agency data available for all eligible jurisdictions to allocate funds applying formula methods. At this time, HUD has allocated approximately $14 billion, by formula and to Rebuild by Design projects, and has determined that the data available for the earliest disasters, in particular, does not credibly represent additional current unmet needs (beyond those for which HUD has already allocated funding by formula) to support such a formula allocation method for the remaining funding. No other reasonably current data sources common to all possible eligible jurisdictions exist. Because the law directs that CDBG-DR assistance must flow to the most impacted and distressed areas with unmet recovery and revitalization needs related to the effects of a covered major disaster, HUD decided that a competition framework would work best to elicit the data needed to inform allocation choices and ensure that the unmet disaster recovery and revitalization needs of communities around the country are appropriately considered. According to the grant announcement issued September 17, 2014 there are six goals for this grant which are "First, to fairly allocate remaining PL 113-2 CDBG disaster recovery funds. Second, to create multiple examples of local disaster recovery planning that applies science-based and forward-looking risk analysis to address recovery, resilience, and revitalization needs. Third, to leave a legacy of institutionalizing in as many states and local jurisdictions as possible the implementation of thoughtful, innovative, and resilient approaches to addressing future risks. Fourth, to provide resources to help communities plan and implement disaster recovery that makes them more resilient to future threats or hazards, including extreme weather events and climate change, while also improving quality of life for existing residents and making communities more resilient to economic stresses or other shocks. Fifth, to fully inform and engage community stakeholders about the current and projected impacts of climate change and to develop pathways to resilience based on sound science. Sixth, to leverage investments from the philanthropic community to help communities define problems, set policy goals, explore options, and craft solutions to inform their own local and regional resilient recovery strategies. As with all CDBG assistance, the priority is on serving low- and moderate-income people."

Requirements: This particular HUD grant is not available for the State of Georgia. It is only open to local or State governments that experienced a Qualified Disaster during 2011-2013. We mention it for two reasons. First. HUD has made considerable federal funding available that could be applied to GIS data development in the past few years. For example, following two presidentially declared disasters in Georgia during 2008 the Georgia Department of Community Affairs applied for the US Department of Housing and Urban Development's Disaster Recovery Enhancement Fund. The Disaster Recovery Enhancement Fund (DREF) was a $311.6-million set-aside under the disaster recovery supplemental appropriation P.L. 110-329. DREF awards were announced August 26, 2010. Georgia received $640,000 the second smallest amount of 13 eligible states. A portion of that funding was used to support the development of a translator for the WinGAP property data system, training on the Hazus-MH technology and development of four county risk assessments. Should Georgia experience a qualified disaster in the future, HUD may provide additional funding opportunities.

Funder: Economic Development Administration

Title: Planning Program and Local Technical Assistance Program

Submission Due Date: Ongoing

Amount: Up to $100,000

URL: http://www.eda.gov/funding-opportunities/ or http://www.grants.gov/view-opportunity.html?oppId=189193

Summary: The Georgia Regional Commissions are already the recipient of a grant from this agency that is being used to fund the first two years of the Georgia GIO staff and activities. Additional funding for GIS related support may also be available in the future.

Requirements: Eligible applicants for this program include Nonprofits having a 501(c)(3) status with the IRS, other than institutions of higher education; State governments; Native American tribal governments (Federally recognized); City or township governments; County governments; Private institutions of higher education; Public and State controlled institutions of higher education; and Nonprofits that do not have a 501(c)(3) status with the IRS, other than institutions of higher education Others (see text field entitled "Additional Information on Eligibility" for clarification). There is a cost sharing requirement for this grant. For both Planning and Technical Assistance awards, the minimum EDA investment rate is 50 percent, and the maximum allowable EDA investment rate generally may not exceed 80 percent.

In addition to direct funding for GIS support, we encourage Georgia to consider opportunities to reduce costs as a result of implementing a statewide GIS coordination effort. Once example of this relates an opportunity to support the reduction of flood insurance premiums by as much as 45% through credits acquired through the Federal Emergency Management Agency Community Rating System program. The Community Rating System (CRS) is a voluntary program for National Flood Insurance Program (NFIP) participating communities. The goals of the CRS are to reduce flood damages to insurable property, strengthen and support the insurance aspects of the NFIP, and encourage a comprehensive approach to floodplain management. The CRS has been developed to provide incentives in the form of premium discounts for communities to go beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding. For a community to be eligible for this program it must be in full compliance with the National Flood Insurance Program and in the Regular phase of the program. Activity 440, as described in the National Flood Insurance Program Community Rating System Coordinator's Manual indicates that credits can be obtained by putting the Flood Insurance Rate Map and Floodway map delineations on a digitized mapping system. It also includes credit for adding or overlaying additional data such as sensitive areas, zoning districts, assessor data and other map layers used regularly by the community's staff. As of May 1, 2014, Georgia has CRS 48 eligible communities.[35]

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[35] Based on FEMA Community Rating System (CRS) Communities and their Classes - http://www.fema.gov/media-library-data/1398878892102-5cbcaa727a635327277d834491210fec/CRS_Communites_May_1_2014.pdf

Appendix F: 2014 IndianaMAP Statistics

The following table provides statistics reported by the Indiana Geological Survey regarding views of Layer Gallery themes during 2014.

Table 8: 2014 IndianaMAP Layer Gallery Views per Theme

Theme	Views
Demographics	
Census	2,585
Ethnicity	792
Population	1,735
Environment	
Agribusiness	456
Agriculture	937
Crops	894
Ecology	991
Land Cover	1,559
Managed Lands	1,135
Monitoring	517
Remediation	1,050
Soils	1,650
Storage Tanks	663
Waste	1,037
Wind	346
Geology	
Bedrock	5,082
Coal	769
Glacial	724
Industrial Minerals	470
Surficial	2,754
Petroleum	741
Physiography	573
Seismic	950
Silurian	215
Government	
Boundaries	3,666
Congress	341

Theme	Views
General Assembly	384
Local Boundaries	1,853
Voting	412
Hydrology	
Aquifers	835
Canals	287
Floodplains	1,630
Hydrogeologic	850
Karst	613
Hydro Monitoring	364
Water Bodies	2,429
Water Quality	636
Water Wells	816
Watersheds	1,749
Wetlands	1,070
Imagery	
Orthos	658
Best Available	3,683
Imagery Raw	950
NAIP	632
DOQQ	104
Topo	1,955
Infrastructure	
Airports	503
Bridges	406
Communications	609
Critical Facilities	987
Dams	299
Energy	1,492
Facilities	1,129
Interstates	1,253
Railroads	822
Recreation	788
Schools	845
Streets	2,875

Theme	Views
Reference	
Benchmarks	565
Elevation	2,029
Land	3,390
National Grid	477
Places	1,159
PLSS	1,392
Quadrangle	644
Time Zones	71
Zip Codes	379